Basics of E.N.T.

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Basics of

ENT

WITH COLOURED ATLAS

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I dedicate this book to my wife and to my kids, for their endless comprehensive support and understanding

For more information about the author and the field of Otorhinolaryngology, please visit: www.ent-egypt.com

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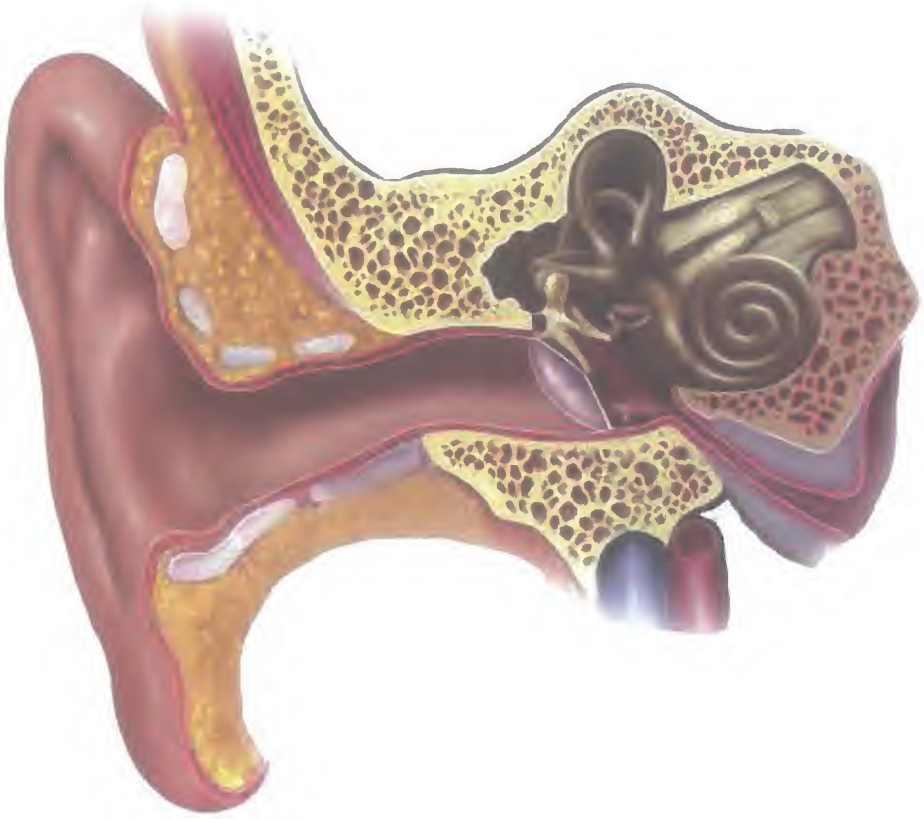
Ear

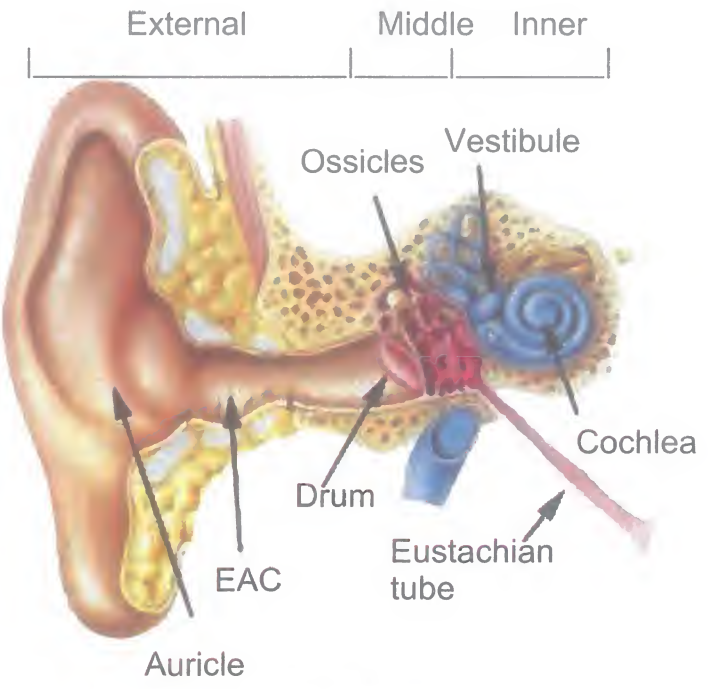


Anatomy

External ear:
Auricle
External auditory canal.
Tympanic membrane.

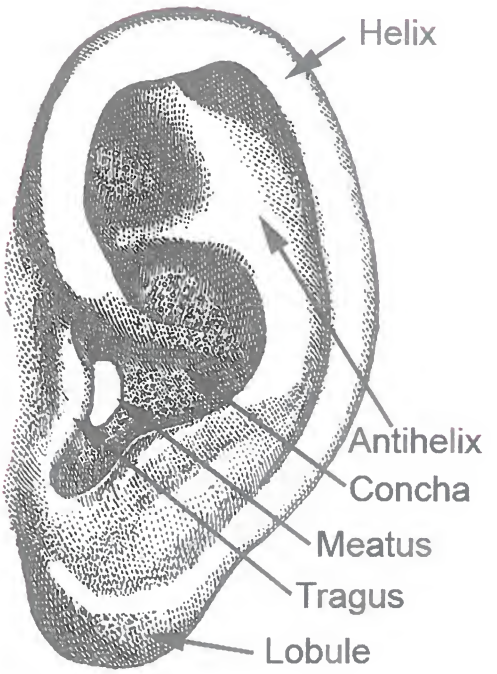
Middle ear (middle ear cleft):
Middle ear cavity.
Mastoid air cells.
Eustachian tube.

Inner ear:
Bony labyrinth.
Membranous labyrinth.



External ear

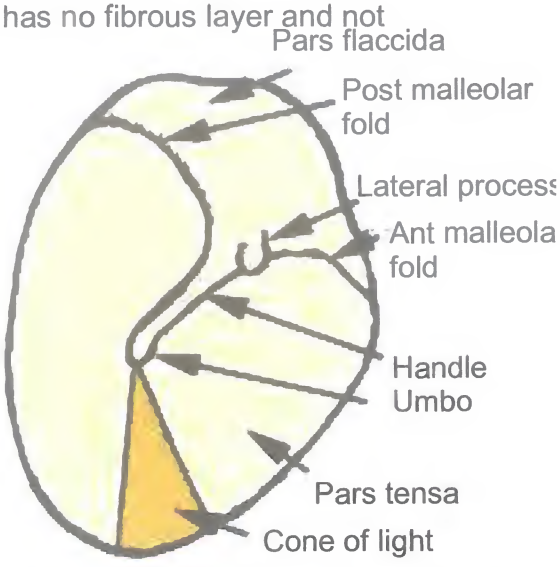
A- Auricle:
It is formed of cartilage covered by skin
- Helix: the outer rolled edge.
- Antihelix: Y-shaped ridge anterior to the helix.
- Concha: depression anterior and below to antihelix.
- Meatus: the opening of external auditory canal.
- Tragus: the ridge covering the meatus.
- Lobule: formed fo fat covered by skin.



B- External Auditory Canal (EAC):
- Its adult length is about 24 mm (1 inch).
- It is formed of outer cartilaginous $^1/_3$ and medial bony $^2/_3$.
- The outer cartilaginous $^1/_3$ is continuous with the cartilage of auricle; lined by thick skin containing hair follicles, sebaceous and ceruminous glands, its direction is upwards, backwards and medially.
- The medial bony $^2/_3$ is a part of temporal bone, lined by thin skin devoid of hair follicles and glands, its direction is downwards, forwards and medially.
- It has 2 constrictions: at the bony-cartilaginous junction and 5 mm from drum (isthmus)
- The medial end of the bony part has a narrow groove called the tympanic sulcus in which the tympanic annulus of the drum is lodged.

C-*Tympanic membrane (TM, Drum):*
*It is oval in shape, 9 x 8 mm, pearly white in colour, concave, surrounded by fibrous ring called tympanic annulus (deficient above) which is lodged in the tympanic sulcus, oblique (55° with the floor).
*It is formed of 2 parts:

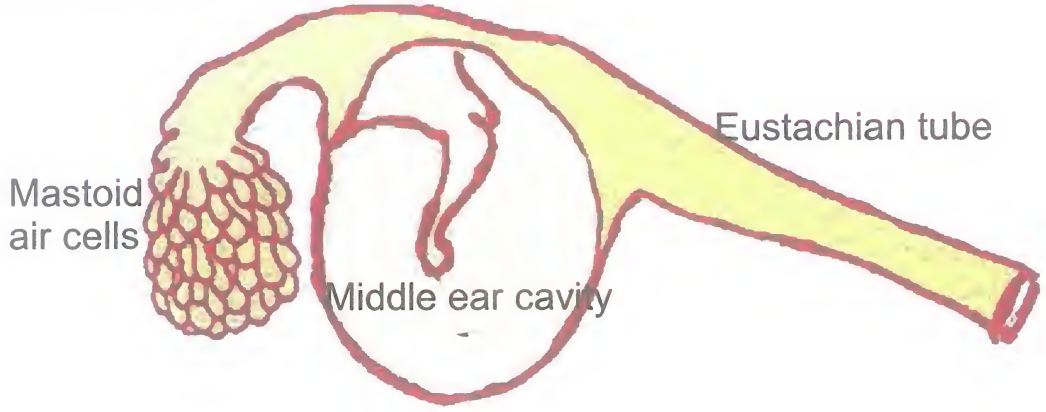
1-Pars flaccida: it is the upper flaccid part, which has no fibrous layer and not surrounded by fibrous annulus.
2-Pars tensa: it is the lower tense part, which has fibrous layer and surrounded by fibrous annulus.



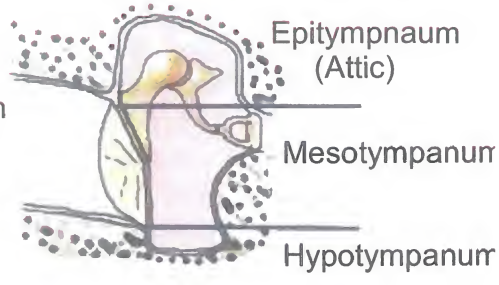
*Layers of the drum:
1-Outer epithelial layer (skin): continuous with that of external auditory canal.
2-Middle fibrous layer: formed of circular and radial layers, not present in the pars flaccida. The handle of malleus embedded in this layer.
3-Inner mucosal layer: continuous with that of the middle ear.

N.B.: The drum is 0.1 mm in thickness in adults but it is thicker in children.
N.B.: The cone of light appears during examination in the antero-inferior part due to the oblique position of the drum (55° with the floor). So, this part reflects the light of otoscope as a cone.

Middle ear cleft



A-Middle ear cavity (ME):
*It has 6 walls and is formed of 3 parts:
♦Attic (epitympanum): it is the upper part, present above the level of the drum, continuous posteriorly with the mastoid antrum through the aditus ad antrum
♦Mesotympanum: it is the middle part, present at the level of the drum.
♦Hypotympanum: it is the lower part, present below the level of the drum.

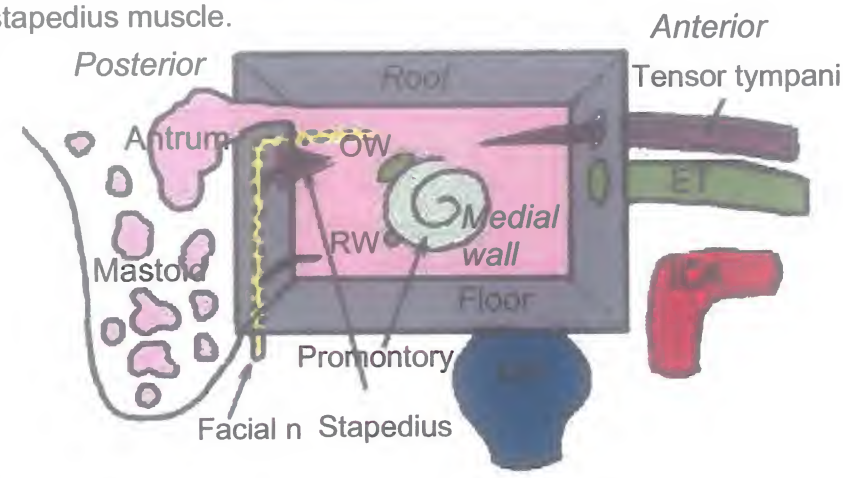


***Walls of ME Cavity:**
1-Roof: formed of thin plate of bone called tegmen tympani separating the cavity from temporal lobe of the brain.
2-Floor: formed of thin plate of bone separating the cavity from the jugular bulb (it is sometimes dehiscent i.e. deficient, leads to high jugular bulb).
3-Anterior: shows 3 canals from above downwards:
- Canal for tensor tympani muscle.
- Eustachian tube.
- Carotid canal contains the internal carotid artery (ICA).

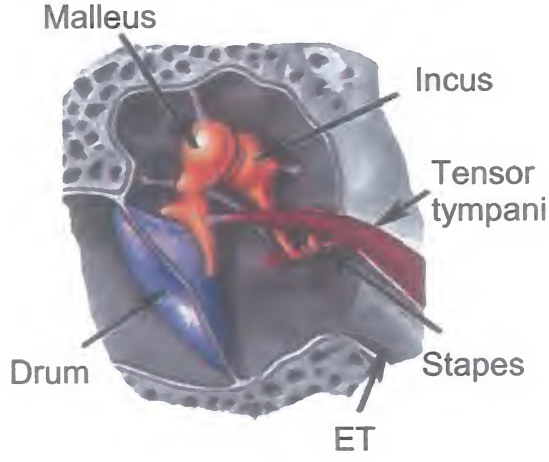
4-Posterior: shows 3 features from above downwards:
- Aditus Ad Antrum (communicating the attic to the antrum).
- The pyramid: contains the stapedius muscle.
- Vertical part of facial nerve in its bony canal.

5-Lateral: formed of the drum, and bone above and below it.

6-Medial: shows 6 features:
- Promontory: first (basal) turn of cochlea.
- Oval window: above and behind the promontory, closed by the footplate of stapes.
- Round window: below and behind the promontory, closed by the secondary tympanic membrane
- Sinus tympani: depression between oval and round windows behind the promontory.
- Processes cochleariformis: pulley-like projection above and anterior to the promontory (the tensor tympani tendon turns 90° around it).
- Transverse part of facial nerve in its bony canal above the promontory and oval window.



***Contents of middle ear cavity:**
- 3 bones (ossicles): Malleus, Incus and Stapes.
- 2 muscles:
. Tensor tympani supplied by trigeminal nerve.
. Stapedius supplied by facial nerve.
- 2 nerves:
. Chorda tympani (of 7th nerve).
. Tympanic plexus (of 9th nerve).
-Air: coming from Eustachian tube.



B-*Eustachian tube (ET):*
- It is 36 mm in length.
- It connects the middle ear cavity to nasopharynx.
- It is directed downwards, forwards and medially.
- It is formed of upper bony $^{1}/_{3}$ and lower cartilaginous $^{2}/_{3}$.
- The lower opening present 1 cm behind the posterior end of inferior turbinate (of nose).
- It is normally closed, open during swallowing and yawning by the action of levator and tensor palati muscles.

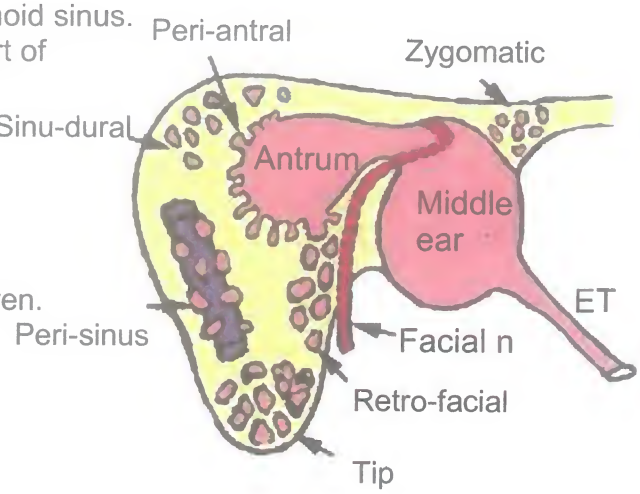
N.B: ET is shorter, wider and more horizontal in children (so acute otitis media is more common in children).

C-*Mastoid air cells:*
- They are many cavities lined by mucous membrane, continuous together and with ME through aditus ad antrum.
- they are formed of:

Antrum: is the largest air cell, communicating to attic through aditus, presenting 2 features in its medial wall, the lateral semicircular canal and 2nd genu of facial nerve.
Tip cells: at the tip of mastoid.
Peri-sinus cells: around sigmoid sinus.

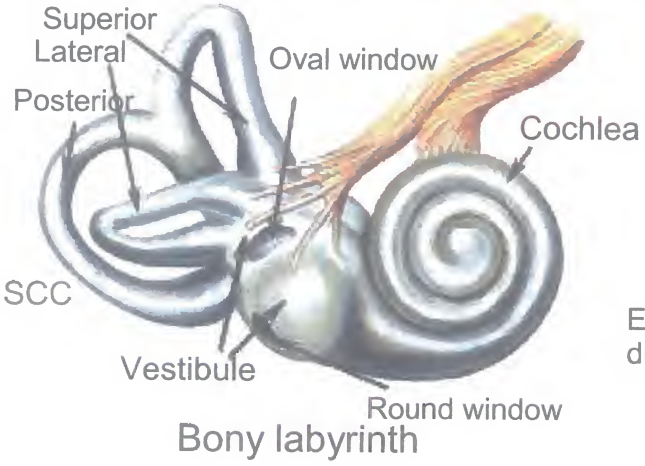
Sinu-dural cells: between dura and sigmoid sinus.
Retro-facial cells: behind the vertical part of facial nerve.
Zygomatic cells: in zygomatic process.
Peri-antral cells: around the antrum.

Types of mastoid:
1- Cellular (pneumatic): 85%.
2- Acellular (sclerotic): 15%.
3- Diploic (contain bone marrow): in children.

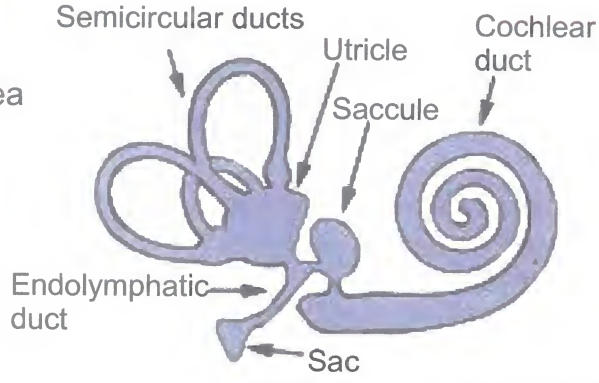


Inner Ear

It is formed of bony labyrinth that houses inside it the membranous labyrinth.



Bony labyrinth



Membranous labyrinth

A- *Bony labyrinth:*

It consists of cochlea, vestibule and 3 semicircular canals (SCC), filled with perilymph and enclosing the membranous labyrinth.

The vestibule:

It is the central part of the bony labyrinth, present posterior to the cochlea and anterior to SCC. Its lateral wall is directed to the middle ear and it shows the oval and round windows. It houses the utricle and saccule of membranous labyrinth.

The semicircular canals (SCC):

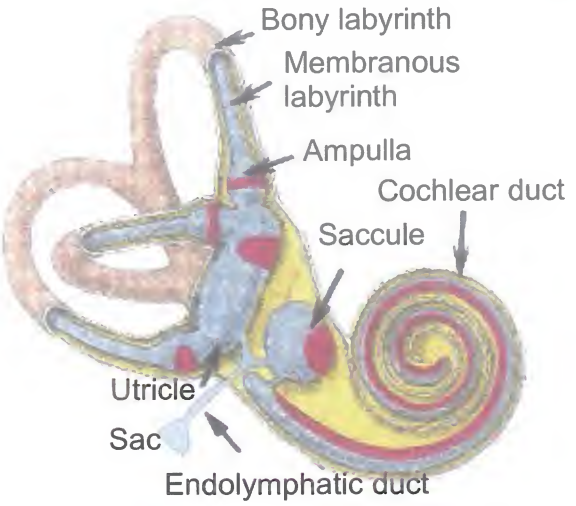
The superior, posterior and lateral canals open into the posterior part of the vestibule by 5 openings. Each canal has a swelling at one end called ampulla. They house the semicircular ducts of membranous labyrinth and positioned at right angle to each other.

The cochlea:

It resembles a snail shell and it opens in the anterior part of the vestibule. It makes 2½ turns around the modiolus, its narrow apex is directed antrolaterally and its wide base is directed posteromedially. Its first turn (base) makes the promontory in the medial wall of the middle ear. It contains 3 compartments; scala vestibuli (it contains perilymph and closed by the footplate of stapes), scala tympani (it contains perilymph and closed by the round window), and scala media (which is the membranous cochlea or cochlear duct that contains endolymph). The scala vestibuli and scala tympani are communicated together at the apex of the cochlea (helicotrema).

B- *Membranous labyrinth:*

It is situated in the bony labyrinth, and it contains endolymph and surrounded with perilymph. It consists of cochlear duct inside the cochlea, utricle and saccule inside the vestibule, 3 semicircular ducts inside the SCC, and endolymphatic duct and sac (the duct inside the vestibular aqueduct and the sac lies beneath the dura).



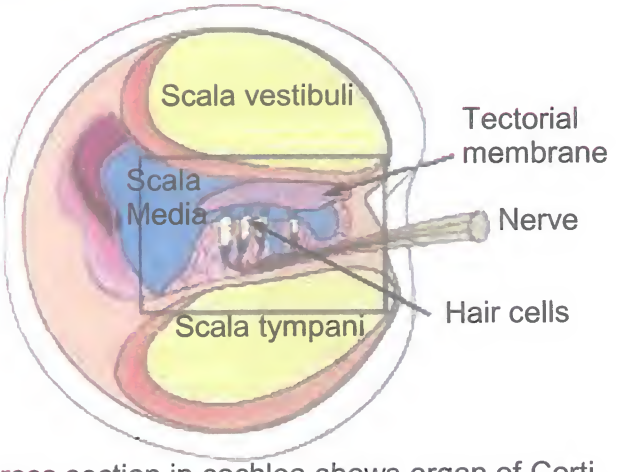
N.B.:

- The cochlear duct contains the sensory neuroepithelium of hearing which is called Organ of Corti.

- The sensory organ of utricle and saccule is called macula, while of SCC is called crista ampullaris (which are concerned with equilibrium).

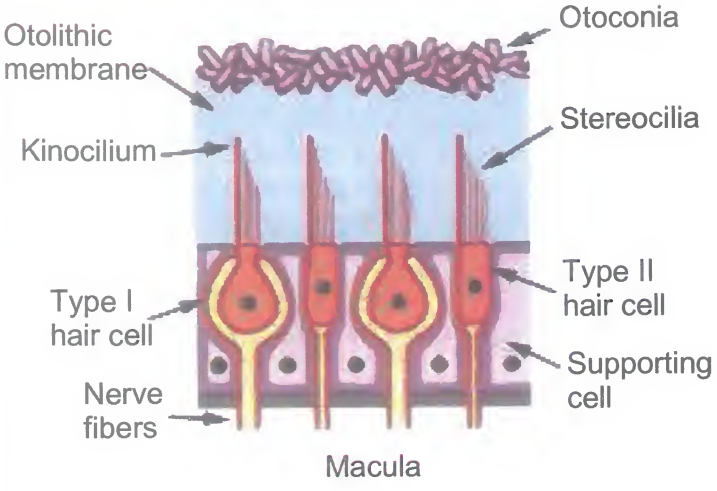
Organ of Corti:

- The cochlear duct (scala media) is triangular in cross section and it has 3 walls; the basilar membrane that supports the organ of Corti, the Reissner's membrane which separates it from the scala vestibuli, and stria vascularis which secretes endolymph.
- Organ of Corti is formed of inner and outer hair cells, supporting cells and tectorial membrane. The bottoms of hair cells are connected to the spiral ganglion in the modiolus that is connected to the cochlear nerve. The tops of hair cells contain stereocelia that touching the tectorial membrane.

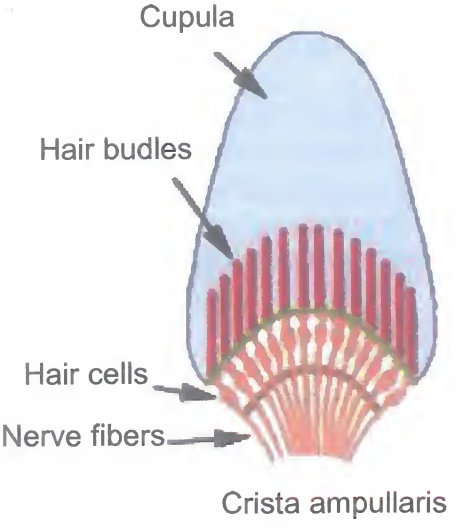


Cross section in cochlea shows organ of Corti

Macula and Crista ampullaris:



Macula



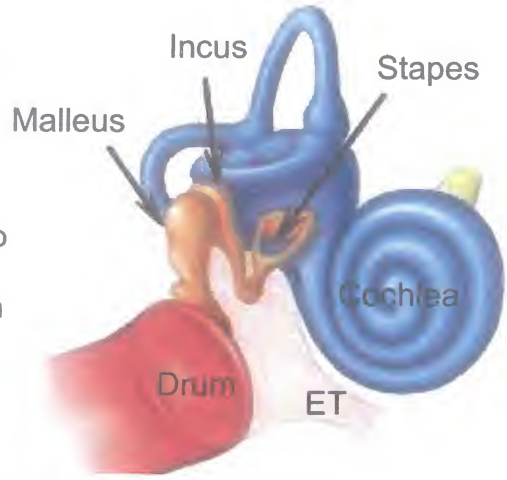
Crista ampullaris

Physiology

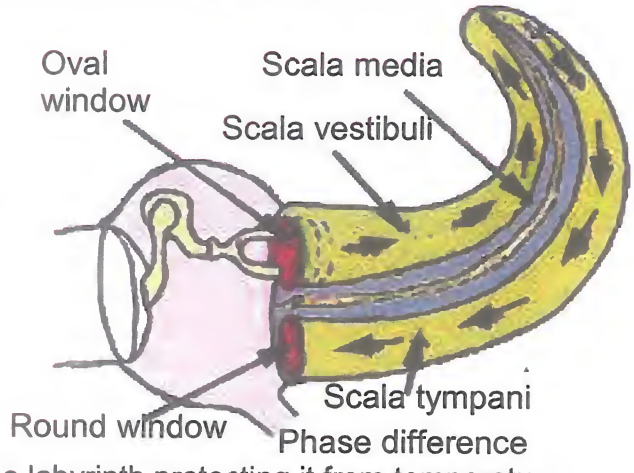
1- Auricle: Its function is collection and localization of sound.

2- EAC: Its function is conduction of sound.

3- Middle ear: its function is
- **Conduction** of sound from tympanic membrane to oval window through the ossicles.
- **Amplification** of sound by about 20 times through 2 factors:
1- Areal ratio: the difference between surface area of the drum and that of oval window is about 17:1.
2- Lever action of ossicular chain.



***N.B.:** This amplification compensates the decrease in sound when the sound transmitted to the fluid of inner ear (impedance matching mechanism).*
***N.B.:** When the oval window becomes in, the round window will be out, this mechanism is called phase difference preventing increase of inner ear pressure.*



4- Eustachian tube: its function is
-Equalization of pressure in both sides of the drum (Ventilation).
-Drainage of middle ear secretion (ME is lined by mucous membrane).

5- Mastoid air cells: It may act as an air reservoir for ME cavity and may insulate the labyrinth protecting it from temperature variations.

6- Inner ear:
a- Cochlear part: concerned with perception of sound (hearing)
b- Vestibular part: concerned with equilibrium, utricle and saccule are responsible for equilibrium in linear acceleration while SCCs are responsible for equilibrium in angular acceleration.

Mechanism of hearing:
The sound waves are collected by the auricle and pass through the EAC. Vibrations of the tympanic membrane are transmitted to the stapes footplate through the ossicular chain. Pressure changes in the labyrinthine fluid leads to movement of the basilar memrane (travelling wave theory). This action leads to frictional movements between the stereocilia of the hair cells and the tectorial membrane that result in electric energy and auditory nerve impulses. Each cochlea sends impulses to both sides of the brain.

N.B.
CHL (Conductive Hearing Loss): caused by defect in the conductive mechanism, due to lesions in EAC and/or middle ear.

SNHL (Sensorineural Hearing Loss): caused by defect in the perceptive and/or neural mechanism, due to lesions in inner ear (cochlear part) or central connection of hearing.

MHL (Mixed Hearing Loss): CHL+SNHL.

Vertigo: caused by defect in the balance mechanism, due to lesions in the inner ear (vestibular part) or central pathway of equilibrium.

Symptoms and methods of ear examination

Before studying ear diseases, you should know what are the symptoms caused by ear diseases, and how to examine for these diseases (detailed history taking and clinical examination were discussed at the end of this book in clinical ENT)

***Symptoms of ear diseases*:** see clinical ENT
-Deafness: diminution of hearing
-Tinnitus: sensation of noise
-Discharge: fluids come out from the ear
-Pain (otalgia) and headache
-Vertigo: false sensation of rotation
-Facial paralysis.
-Swelling and deformity.
-Eye symptoms.

***Methods of ear examination*:** see clinical ENT
-External examination: for auricle, preauricular and postauricular (mastoid) areas by Inspection and Palpation.

-Otoscopy: by using otoscope to see the EAC, tympanic membrane and ME.

-Examination of tympanic membrane mobility (i.e. Eustachian tube is patent or closed) by:
i- Valsalva's method: otoscopic examination of drum while the patient is blowing his nose.
ii- Siegalization: by using Seigle's pneumatic otoscope (otoscope connected to a pump).

-Tuning fork tests: Rinne and Weber tests to detect the type of hearing loss.

-Examination of the ear under the microscope (sometimes needed) to magnify the view.

Valsava's maneuver

Examination under the microscope

Siegle pneumatic otoscope

Clinical testing of hearing: tuning fork tests

Tuning fork used is 512 Hz (as it is equally heard and felt)

Tuning fork

Rinne's test:

- It compares air and bone conduction (AC and BC) in the same ear.
- It denotes the type and not the degree of hearing loss.
- It gives valuable results when the hearing loss exceeds 25dB.
- Strike the fork on your elbow or your knee (never on metallic material).
- Bring the fork with both blades parallel near external auditory meatus (1 cm distance) and then on the mastoid and ask the patient which is louder.

Results:

- Rinne +ve: normal hearing (louder near the meatus) i.e. AC better than BC.
- Rinne -ve: CHL (louder on mastoid) i.e. BC better than AC.
- Reduced Rinne + ve: SNHL i.e. AC is better than BC but both are reduced.
- False Rinne - ve: Severe SNHL (unilateral) i.e. the sound heard by the other ear not the examined ear (which has severe SNHL) when the fork placed on the mastoid.

Weber's Test:

- Comparison of hearing by BC between both ears.
- With the tuning fork placed on the central incisor, forehead or chin (midline).
- Ask the patient if the sound is central or lateralised to right (Rt) or left (Lt).

Results:

- Central: hearing is equal in both ears = Normal.
- Lateralised to Rt. ear or to Lt. ear:

- In CHL: Lateralised to the conductive side (due to the masking effect to noise).
- In SNHL: Lateralised to the normal or better hearing ear.

Schwabach's test:

Comparison of bone conduction between the patient and the examiner (regarding that the examiner is normal).

Results:

Normal: duration of hearing is equal (over the mastoid of the patient and the examiner).
CHL: hearing is prolonged by BC, while in SNHL: hearing is shortened by BC.

Diseases of the external ear

Congenital:

The auricle develops from 6 mesenchymal proliferations which are derived from the 1st and 2nd branchial arches; they are present around the 1st branchial cleft from which the EAC develops.
Congenital anomalies may be unilateral or bilateral.

Microtia and aural atresia

1- Defect in size:
Anotia (no auricle),
Microtia (small auricle),
Macrotia (large auricle).
Treatment: plastic surgery before school age.

2- Defect in shape:
Bat ear (protruding or lop ear).
Treatment: plastic surgery before school age.

Bat ear

3- Accessory auricle:
Small cartilage anterior to the auricle.
Treatment: removal if it is large.

4- Pre-auricular cyst and sinus:
It is usually present at the root of the helix, presented with cystic swelling, repeated infection and discharge.
Treatment: removal

5- Congenital aural (meatal) atresia:
Obstruction of the EAC due to defect in 1st branchial arch. It is more commonly to be associated with ME hypoplasia or ossicular fixation and it is rarely associated with inner ear anomalies.

Clinical picture:
- Microtia or Anotia of auricle: may be present.
- CHL, sometimes mixed HL (if there is inner ear anomaly).

Investigations:
- CT: to assess the anatomy (Middle ear, Inner ear and length of atresia).
-ERA: to assess the hearing (the cochlea is functioning or not) (See Audiology).

Treatment:
- Hearing aid: in bilateral cases to preserve hearing till the age of surgery.
- Meatoplasty: done before school age.
- Plastic surgery to the auricle (if there is microtia).

Aural (meatal) atresia and Accessory auricle

Traumatic:

Haematoma of the auricle

Collection of blood between perichondrium and cartilage.
Aetiology: blunt trauma as box (Boxer's ear).
Clinical picture:
Cystic swelling (painful but not tender).
Complications:
Perichondritis due to secondary infection, then cartilage necrosis and cauliflower ear.
Treatment:
-Antibiotics.
-Incision and evacuation with application of tight bandage.

Haematoma

Foreign body (FB) in external auditory canal

Type of patient: child or mentally retarded adult.
Type of FB:
- Animate: as flies.
- Inanimate:

Vegetable as beans and seeds.
Non-vegetable as beads, cotton and paper
Clinical picture:
- History of FB insertion.
- Irritation and noise (in animate FB).
- CHL (closure of EAC).

Complications:
- Injury: to external auditory canal or drum.
- Infection: to EAC (lead to otitis externa) or middle ear if the drum ruptured (otitis media).

Treatment:
Animate FB: Killed first by oil drops then ear wash.
Inanimate FB:
- Vegetable: removed by hook or suction, No ear wash as it swells with water.
- Non-vegetable: removed by ear wash, hook or suction.

N.B.: if the child is not co-operative we should use general anaesthesia.

Traumatic rupture of the drum: see traumatic diseases of the middle ear.

Inflammatory:

Perichondritis of the auricle

Inflammation of the perichondrium and cartilage of the auricle.
Aetiology: 1- Infected haematoma.
2- Infected surgical wound.
3- Furuncle (if squeezed).
Clinical picture: the auricle is swollen, red, hot, painful and tender.
Complications: necrosis of the cartilage, followed by fibrosis (cauliflower ear).
Treatment:
-Antibiotics: local + systemic.
-Analgesics.
-Incision and drainage with debridment (removal of necrosed cartilage).

Perichondritis

Cauliflower ear

Otitis externa (OE)

Inflammation of external auditory canal (EAC); it may be **viral**, **fungal** or **bacterial**.

Viral otitis externa:

a) Herpes simplex: occurs with fevers, characterized by vesicles.

b) Herpes zoster: caused by chickenpox virus, characterized by painful vesicles.

N.B.: ***Ramsay-Hunt syndrome***: It is a herpes zoster oticus characterized by:

Otalgia (pain),
Vesicles,
Facial paralysis (7th),
SNHL and vertigo (8th), as it is a neurotropic virus.

Treatment:
-Analgesics for pain.
-Acyclovir: Local and systemic.

c) Bollous myringitis: characterized by bullae filled with serous fluid and may be blood in the outer layer of the drum.
Treatment:
-Analgesics for pain.
-Antibiotics: Local and systemic to prevent 2ry infection.

Bollous myringitis

Fungal otits externa: Otomycosis

Fungal infection of the external auditory canal.

Aetiology: Aspergillus Niger + Candida albicans.

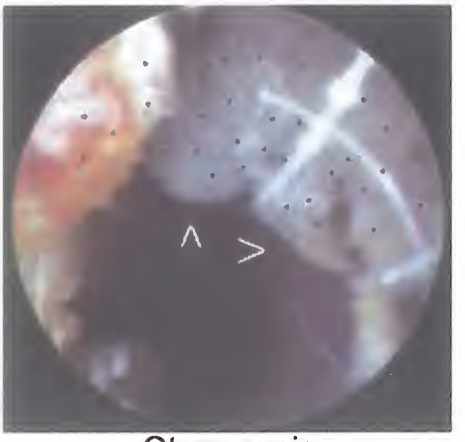
Clinical picture:

Symptoms:
- Itching in EAC.
- Deafness (if EAC is obstructed).

Signs:
Fungal mass like a wet news paper (white mass and black spots)

Treatment:

1- Local cleaning of EAC: suction or ear wash.
2- Antifungal ear drops as:
- Nystatin ear drops
- 2% salicylic acid (Keratolytic) + Alcohol 70% (Fungicidal) ear drops.
3- Packing of EAC with antifungal cream on a piece of gauze (if resistant).



Otomycosis

Bacterial otitis externa:

(a) Localized OE (Furuncle).
(b) Diffuse OE
(c) Malignant OE

Localized otitis externa (Furuncle)

Staphylococcal infection of hair follicle (In the outer third of EAC).

Predisposing factors: Diabetes (furunculosis is multiple and recurrent in diabetics).

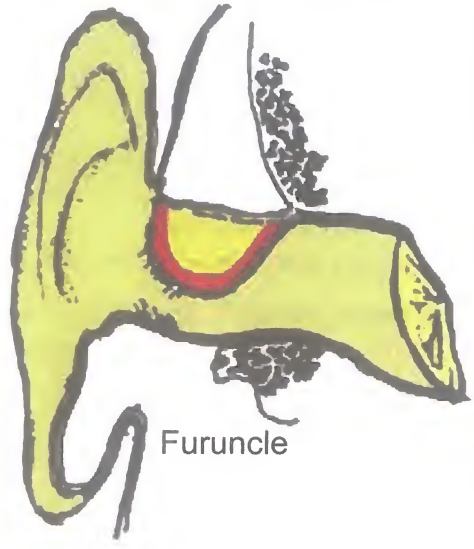
Clinical picture:

. Symptoms:

- Pain (increases on mastication).
- Discharge: Scanty, purulent, and cheesy.
- Deafness (if EAC is obstructed).

. Signs:

- Tenderness (on pulling the auricle or pressure on the tragus).
- Internal swelling in EAC, which is reddish (in outer third only as it contains hair follicles)
- External swelling: enlarged tender pre- and post-auricular lymph nodes.


Furuncle

Investigations: blood sugar in recurrent cases.

Treatment:

- General: Antibiotics + Analgesics.
- Local:

. Local cleaning of EAC by suction (no ear wash as it leads to spread of infection).
. 10% Glycerin icthyol ear drops (Glycerin is hygroscopic, while icthyol is counter irritant)
. Packing EAC with cream containing: Antibiotic + Steroid.
. Incision and drainage if a localized abscess has formed.

N.B: Avoid squeezing of a furuncle (lead to perichondritis).

Diffuse otitis externa

Diffuse inflammation of EAC.

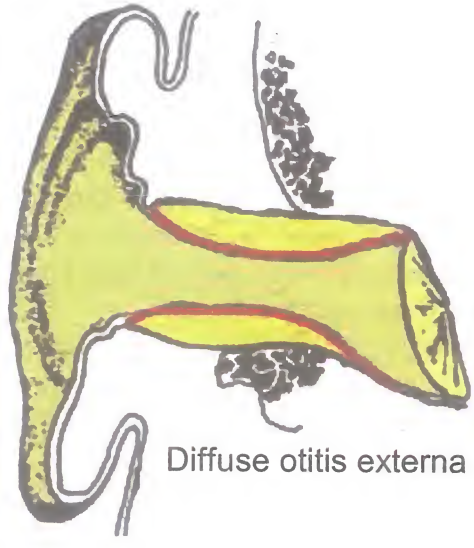
Predisposing factors:

- **S**cratch of EAC.
- **S**wimming in infected swimming pool
- **S**weating if excessive.
- **S**eborrhea.
- **S**ugar (Diabetic).

Clinical picture:

. Symptoms:

- Pain (increases on mastication).
- Discharge: scanty and purulent.
- Deafness: (if EAC is obstructed)


Diffuse otitis externa

. Signs:

- Tenderness (on pulling the auricle or pressure on the tragus).
- Internal swelling: diffuse, red, and oedamatous EAC.
- External swelling: enlarged tender pre and post-auricular lymph nodes.

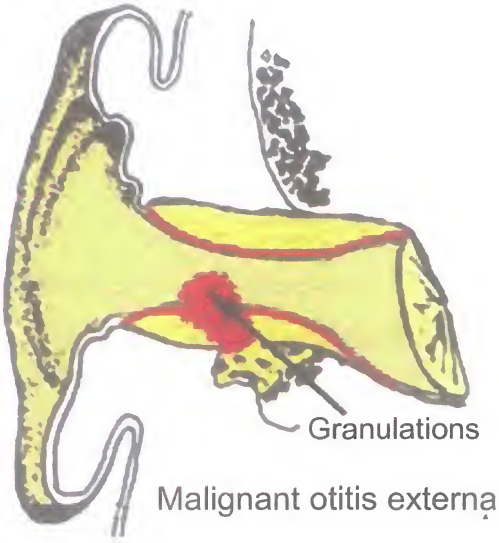
Investigations:

1) Blood sugar for diabetes (if recurrent)
2) Culture and sensitivity of discharge (if resistant).

Treatment:
- General: Antibiotics + Analgesics.
- Local:
. Local cleaning of EAC by suction (no ear wash).
. 8% Aluminium acetate packing (astringent).
. Packing EAC with cream: containing antibiotic + steroid.

Malignant otitis externa
(Skull base osteomyelitis, Necrotizing otitis externa)

Severe infection starts in the EAC (i.e. cellulitis) and spread to involve skull base (i.e. osteomyelitis).
Causative organism: Pseudomonas aureginosa.
Predisposing factors: low immunity as diabetes.
Clinical picture:
. Symptoms: as diffuse OE but the pain is severe and prolonged.
. Signs: as diffuse OE with granulations in the floor of EAC at the bony-cartilaginous junction.
Extensions: due to osteomyelitis
a) Facial palsy (compressed at stylomastoid foramen).
b) Parotid swelling.
c) Lower 4 cranial nerves palsy (compressed at jugular foramen).
d) Trigeminal facial pain if it extends to petrous apex.



Malignant otitis externa

Investigations:
- Culture and sensitivity → pseudomonas aureginosa.
- Fasting blood sugar
- CT Scan.
- Gallium and Tecntium scan.
- Biopsy from the granulations→ to exclude tumour

Treatment:
- Hospitalization and control of diabetes.
- Systemic antibiotics: Quinolones as Ciprofloxacin (for pseudomonas).
- Local cleaning of EAC by suction.
- Local antibiotics: Ciprofloxacin ear drops.
- Surgical debridement: sometimes needed.

Neoplastic:

Tumours of the auricle
- Benign:
Papilloma or naevus (skin), Chondroma (cartilage).
- Malignant:
a) Sq. cell carcinoma.
b) Basal cell carcinoma (Rodent ulcer).


Exostosis of EAC

Tumours of the EAC
- Benign: Exostosis (Osteoma of EAC, may be single or multiple, unilateral or bilateral).
- Malignant: squamous cell carcinoma (see tumours of the middle ear).

Ear Wax

It is a normal secretion of ceruminous and sebaceous glands (from outer $^1/_3$ of EAC)

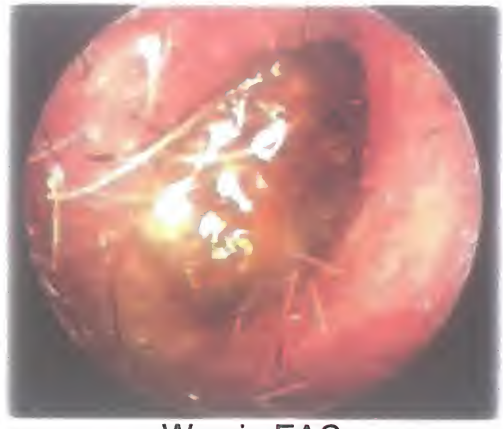
N.B.: it is usually cleared spontaneously by epithelial migration.

Clinical picture:

. Symptoms: if impacted (especially after bathing or swimming) lead to:

- Deafness: (CHL)
- Tinnitus.

. Signs: Dark brown (hard) or yellowish (soft) wax seen by otoscope.



Wax in EAC

Treatment:

Ear wash (If it is hard, it should be softened by glycerin bicarbonate or H_2O_2 ear drops before wash).

Ear Wash

- **Indications:**

- Wax (if excessive or impacted): it is softened by glycerin bicabontae if it was hard.
- FB (not impacted and not vegetable).
- Otomycosis (Fungal mass): suction is preferred.
- Caloric test: to test the vestibular function (see vertigo).

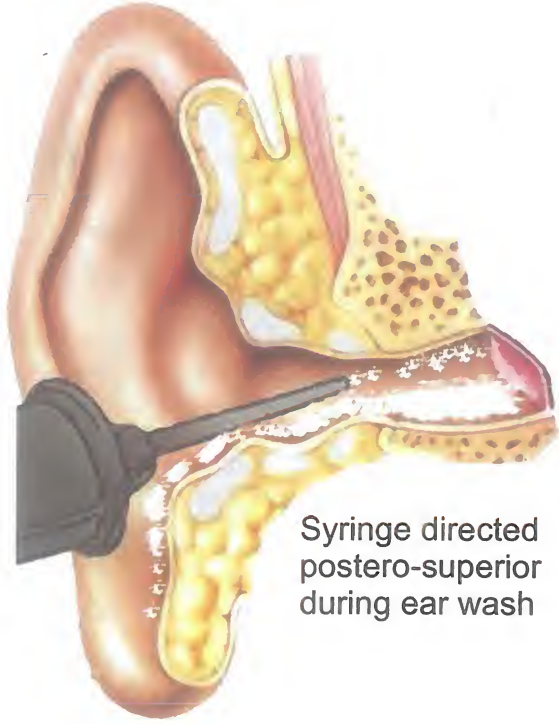
- **Contraindications:**

- Perforation (traumatic or pathological i.e. CSOM).
- FB (impacted or vegetable).
- Otitis externa (bacterial or viral).

- **Technique**:

-The patient should be seated with a towel covering his clothes.

-A syringe filled with warm water (about 37° to avoid vertigo) and the nozzle is directed postero-superior (to avoid injury of the drum), after wash dry the EAC with alcohol.



Syringe directed postero-superior during ear wash

- **Complications**: 2 **I** + 2 **S**

1-**I**njury to: EAC or Drum (Rupture).
2-**I**nfection to: EAC (Otitis Externa) or ME (Otitis Media) after rupture of the drum.
3-**S**timulation of inner ear leads to vertigo and nystagmus.
4-**S**timulation of vagus leads to reflex cough and vaso-vagal attack.

N.B. Manifestations of tympanic membrane rupture during ear wash:

- Sudden pain.
- Bleeding.
- Deafness and tinnitus.
- Fluid trickling in the throat.

Diseases of the middle ear

Congenital:
hypoplasia or aplasia of the middle ear.
Congenital ossicular fixation as in Treacher-Collins syndrome.
Congenital cholesteatoma

Traumatic:
Traumatic rupture of the tympanic membrane.
Otitic barotraumas.
Fracture base of the skull (temporal bone).

Inflammatory:
Acute otitis media (AOM).
Chronic otitis media (suppurative and non suppurative).
Complications of otitis media.

Neoplastic:
Glomus tumor.
Squamous cell carcinoma.

Miscellaneous:
Otosclerosis (although it is a disease of otic capsule; it is categorized under ME diseases)

Acute Otitis Media (AOM)

Acute inflammation of mucosal lining of middle ear cleft.

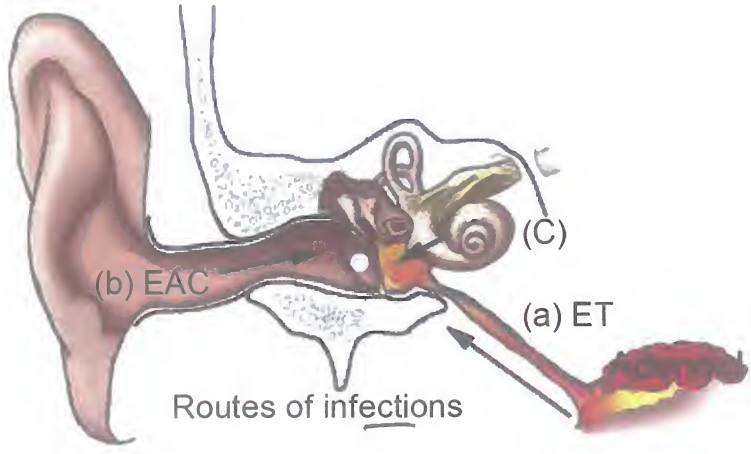
- ***Aetiology:***

-Causative organism:
- Strept. Pneumoniae
- Hemophilus influenzae
- Moraxella catarrhalis.

-Routes of infection:
(a) Eustachian tube (ET)

*Extension of infection:
- Nose: rhinitis of common cold
- Sinuses: sinusitis
- Nasopharynx: adenoid.

*Passage of infected material:
- Vomitus.
- Infected milk.
- Infected water.
- Nasal packing.



Routes of infections

(b)External auditory canal (EAC): in cases of perforated drum.
(c)Blood borne infection: rare.

- **Pathology:** 5 stages

1-Tubal catarrh: oedema and congestion of ET (in rhinitis) leads to its obstruction and retraction of drum due to –ve middle ear pressure.
2- Catarrhal OM: oedema and congestion spread to ME mucosa with serous exudate.
3- Suppurative OM: accumulation of pus in middle ear.
4- Perforation: due to necrosis of the drum lead to discharge.
5- Recovery: healing of drum and resolution of pathological changes.

- **Clinical Picture:**
- It corresponds to the stages of pathology.
- Recovery may occur at any stage if adequate treatment is given.

(1) Tubal catarrh:

Symptoms:

Deafness and Tinnitus (which are not marked)

Signs:

Otoscopy: retracted drum, which is seen as:

- Prominent lateral process.
- Shortened handle of malleus.
- Disturbed or absent cone of light.
- Exaggerated ant. and post. malleolar folds.
- Limited mobility on siegalization.

Tuning Fork (TF) test: CHL.

Normal tympanic membrane

(2) Catarrhal otitis media:

Symptoms:

Deafness, Tinnitus and Pain.

Signs:

Otoscopy: congested drum
(Mainly at the periphery and the handle).

Tuning Fork test: CHL.

(3) Suppurative otitis media:

#Symptoms:

Deafness, Tinnitus, Pain (throbbing) and Fever.

#Signs:

Otoscopy: bulging drum.

Tuning Fork test: CHL.

Congested tympanic membrane of AOM

(4) Perforation:

#Symptoms:

Deafness, Tinnitus, and discharge, Pain and fever become less.

#Sings:

Otoscopy:

- Discharge: mucopurulent, and pulsating.
- Perforation: Antero-inferior (near ET opening).
- ME mucosa: congested and oedematous.

Tuning Fork test: CHL.

- **Treatment:**

General:

(a) Systemic antibiotics.
(b) Analgesic antipyretic.

Local:

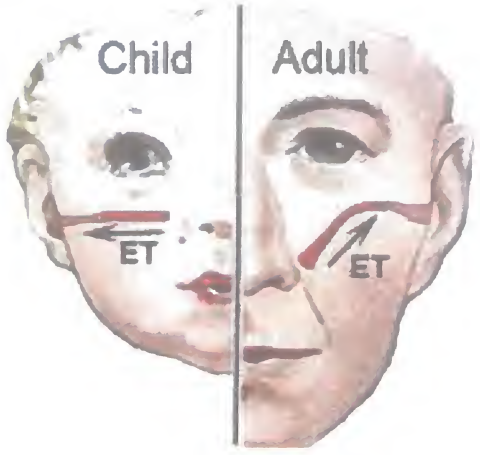
According to the stage.
(a) In ET catarrh: decongestant nasal drops as xylometazoline
(b) In catarrhal OM: Glycerin phenol warm ear drop, as glycerin is hygroscopic, phenol is local anaesthetic, warm to increase vascularity.
(c) In suppurative OM (Bulging drum):
Myringotomy (incision of drum for drainage), suction and local antibiotics ear drops
(d) In perforation:

- Myringotomy (if the perforation is small or high up).
- Repeated cleaning by suction or dry mopping.
- Local antibiotic ear drops.

AOM in infants and children

Acute inflammation of mucosal lining of middle ear cleft.

Causative organisms: as before (in AOM)



Predisposing factors: ARTER

* *Adenoid:* causes ET obstruction and infection.
* *Respiratory tract viral infection:* common cold and exanthemata are more common in children.
* *Teething:* it decreases the immunity of infants.
* *Eustachian tube:* shorter, wider and more horizontal in children.
* *Regurgitation of milk or vomitus:*

Milk: Artificial fed baby is more liable than breast fed due to:

- Artificial milk is liable to be contaminated.
- Artificial milk contains no antibodies (↓ immunity).
- The flat position with artificial feeding facilitates enterance of milk to ET.

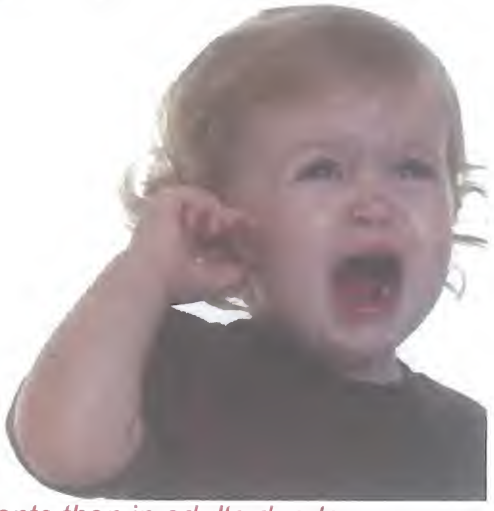
Vomitus: in gastro-enteritis may pass through Eustachian tube.

Clinical Picture:

Symptoms:

General:

-Fever and rigors (the heat regulating center is not fully developed in infants).
-Vomiting and diarrhea may be misdiagnosed as gastroenteritis.
-The child cries and does not sleep (due to pain).



Local:

-Pulling the ear.
-Movement of head from side to side.

Signs: There may be only absence of cone of light or congestion as the drum of children is thick and resist bulging.

N.B.: Complications of AOM are more common in infants than in adults due to:
1- The drum is thick → resisting bulging.
2- Low Immunity of infant.

Treatment:

General:

- Systemic antibiotics.
- Analgesic antipyretics.

Local:

- Decongestant nasal drops as xylometazoline to open ET.
- Glycerin phenol warm ear drops.
- Myringotomy: may be needed early for pus drainage (If medical treatment failed for 48 hours) to avoid complication. Suction is usually needed with antibiotic ear drops.

N.B. Prognosis of AOM:

- Complete recovery: with adequate treatment, good immunity, and low virulence.
- Complications: without treatment, low immunity, and high virulence.
- Chronicity: either suppurative or non-suppurative due to inadequate treatment.

N.B.: Necrotizing OM: *occurs in exanthemata leading to total necrosis of the drum.*

Chronic Otitis Media

Types:

1- Chronic non-suppurative OM:

(a) Secretory OM (SOM).

(b) Adhesive OM.

2- Chronic suppurative OM:

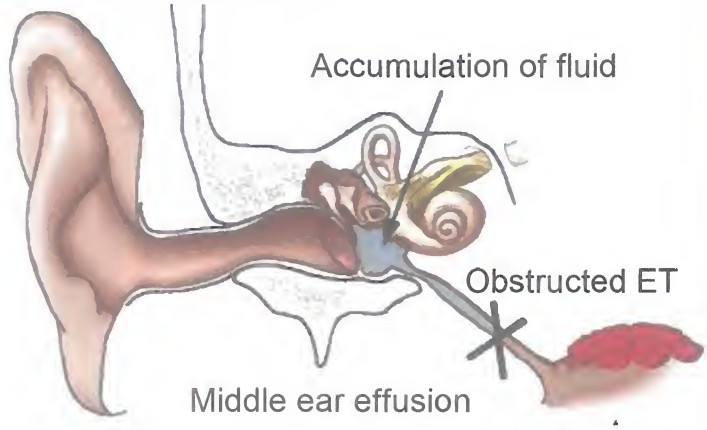
(a) Safe (Mucosal, tubo-tympanic type).

(b) Unsafe (bony, Attico-antral type).

Secretory otitis media

(Glue ear, Middle ear effusion, OM with effusion)

Accumulation of non-purulent effusion behind an intact drum.



• **Types:**

A-Serous: transudation of fluid from blood vessels due to -ve ME pressure.

B-Mucoid: active secretion by mucosal glands of ME.

• **Aetiology:** ET obstruction that may be caused by either

1- **O**titis media if acute, recurrent with inadequate treatment.

2- **V**iral infection.

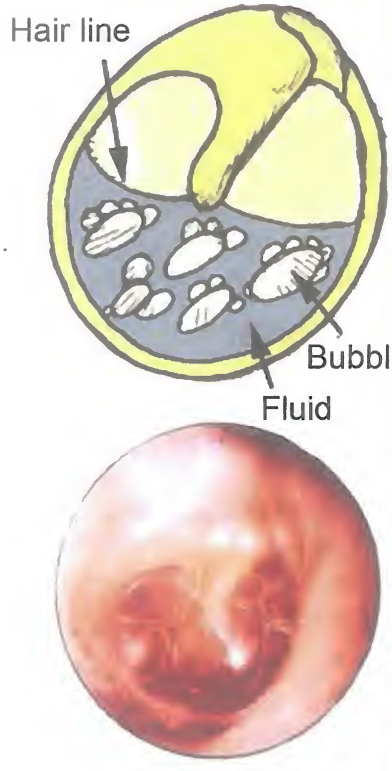
3- **E**ustachian tube obstruction by adenoid, or infection (common cold).

4- **C**left palate (deficient palatal muscles).

5- **T**umour in the nasopharynx: (unilateral in old age).

6- **R**adiotherapy to head and neck.

7- **A**llergy of ME mucosa.



• **Clinical picture**:

#Symptoms:

1) Deafness and Tinnitus: may be unilateral or bilateral (in adenoid), usually the child presented with school retardation.

2) Bubbling sensation (fullness) in the ear.

#Sings:

1) Otoscopy:

- Intact retracted drum and its colour is either amber yellow (in serous type) or dull gray (in mucoid type).
- There may be fluid level (hair line).
- There may be bubbles.

2) Tuning Fork test: CHL.

• **Investigations:**

- PTA (Pure tone audiometry): CHL.
- Tympanometry: type B (flat curve): see audilogy chapter.
- X-ray lateral view nasopharynx for adenoid.

• **Treatment:**

 # Medical:

a. Treatment of the cause: infection or adenoid.

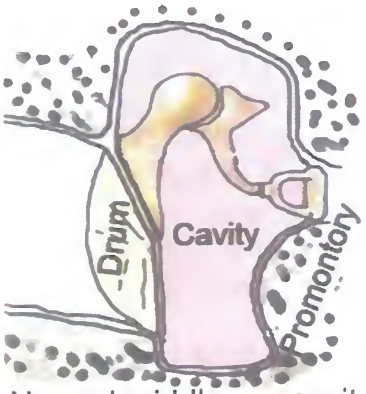
b. Systemic Antibiotics to prevent recurrent infection.

c. Steroids: withdrawal method.
d. Mucolytics: to dissolve mucoid secretion.
e. Decongestant nasal drops to open ET.
f. Valsalva maneuver and chewing gum to open ET.

 # Surgical: if medical treatment failed.
Myringotomy and insertion of ventilation tube with adenoidectomy if there is adenoid.
Types of ventilation tube:
- Grommet's tubes: temporary tubes, as spontaneous extrusion occurs within about 6 months.
- T-tubes: permanent tube, preferred in adults.


Grommet's tube placement

N.B: Prognosis of secretory otitis media:
- Recovery: with proper treatment.
- Resolution: spontaneously (somtimes).
- Recurrent infection (recurrent AOM).
- Retention of glue for long time leads to adhesion and even tympanosclerosis.



Normal middle ear cavity

Adhesive otitis media

Retraction of the drum, which become in contact with the promontory (atelectasis) with adhesion of ME structure.

Aetiology:
- Long standing ET obstruction.
- It may follow Secretory OM.
- It may follow healed CSOM.


Atelectatic cavity

Clinical picture:
Symptoms: Deafness + Tinnitus.
Signs: - Otoscopy: retracted drum (signs?).
- Tuning Fork test: CHL.

Investigations:
- PTA: CHL.
- Tympanometry: type C (ET dysfunction).

Treatment:
- Prophylactic: treat the cause.
- Curative: Cartilage tympanoplasty **or** hearing aid.

Tympanosclerosis

White patches seen through the drum (fibrosis).

Pathology: Hyaline degeneration of the collagen bundles with calcification.

Cause: It may be due to previous trauma (accidental or surgical), healed CSOM or idiopathic.

Clinical picture:
Symptoms: deafness (CHL) and tinnitus.
Signs: white patches seen through the drum

Treatment:
Surgery usually fails, so hearing aid is used.


Tympanosclerosis

Chronic suppurative otitis media (CSOM)

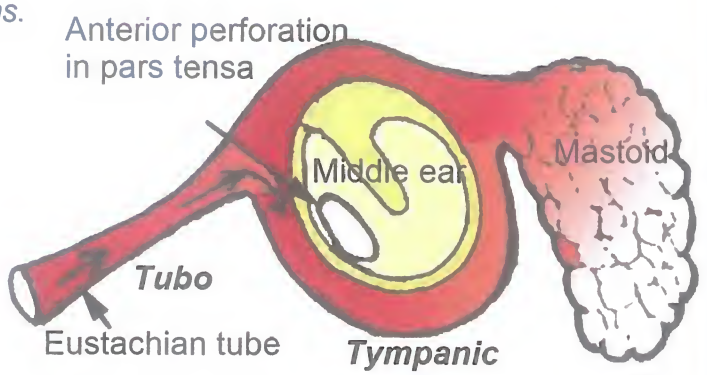
Chronic inflammation of mucoperiosteal lining of ME cleft characterized by perforation and discharge (persistent in unsafe type **or** intermittent in safe type).

Types: Safe and Unsafe.

Safe CSOM: *(Tubotympanic or mucosal CSOM)*

Characters:

- *Affects mucosa of ME cleft.*
- *Less liable to produce complications.*



Aetiology: AOM → CSOM due to:

1- Inappropriate treatment due to:
a- Ineffective antibiotics.
b- Short course of antibiotics.
c- Inadequate drainage.
2- High virulence of organism.
3- Low immunity of the patient.

Clinical picture:

Symptoms:

- Deafness and tinnitus.
- Intermittent discharge.

Signs:

(1) Otoscopy:

- Discharge: profuse, mucopurulent, and odourless.
- Perforation: central in the pars tensa (there is rim of the drum all round the perforation i.e. not reaching to annulus).
- Middle ear mucosa: may be either:

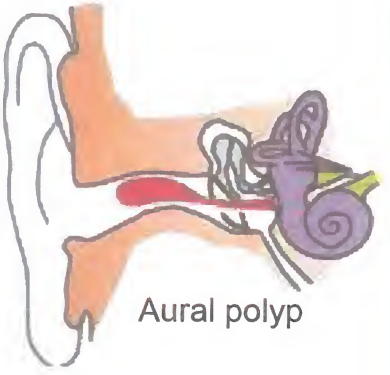
(a) Thin pale and dry: if inactive.
(b) Oedematous and congested: if active infection.
(c) Granulations: sessile reddish tissues, which bleed on touch.

(d) Polyp: pedunculated, oedematous mucosa passing through perforation.

(2) Tuning Fork test: CHL.

Investigations:

1- Pure tone audiometry (PTA) → CHL.
2- Culture and sensitivity of discharge (if the ear is not dry).



Treatment:

1- Medical treatment:

(a) General: Systemic antibiotics (Given according to culture and sensitivity).
(b) Local: - Local antibiotic ear drops.
- Aural toilet by suction or by dry mopping.
(c) Prevention of re-infection by:
- Avoid wetting of the ear (keep it dry).
- Control any upper respiratory infection as common cold.

2- Surgical treatment: Tympanoplasty with or without cortical mastoidectomy.

N.B.: *Tympanoplasty should be combined with cortical mastoidectomy if there is discharge (i.e. failure of medical treatment to control the infection).*
But if the ear is dry → Tympanoplasty without cortical mastoidectomy (Myringoplasty).

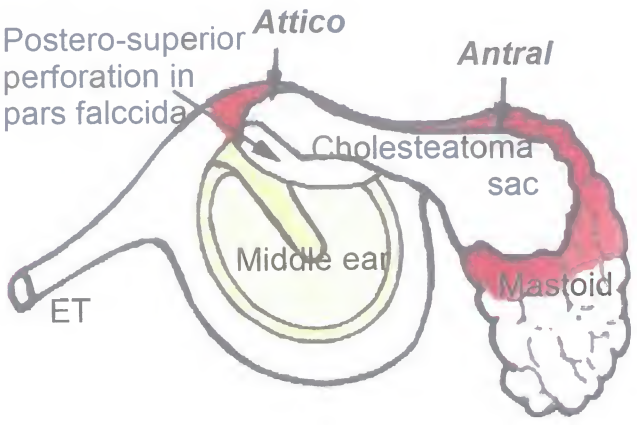
Unsafe CSOM: (Attico-antral or bony CSOM or Cholesteatoma)

Characters:

- Erosion of bone.

- More liable to produce complications.

Cholesteatoma: The name is wrong as
Cholest: not necessarily contain cholesterol.
Oma: not a tumour.
It is a sac of keratinized stratified squamous epithelium (skin) called matrix filled with keratinous material (± cholesterol) and it erodes the bone by osteolytc enzymes or 2ry infection.



Aetiology and types:

1- Congenital Cholesteatoma (Epidermoid):

- Sites: - Petrous apex.
  - Cerebello pontine angle (CPA).
  - Middle ear.

N.B.: The drum is intact.

- Clinically presented by:
  - Trigeminal facial pain (if present in petrous apex).
  - Facial tics then paralysis + SNHL + vertigo (if present in CPA).
  - CHL (if present in ME).

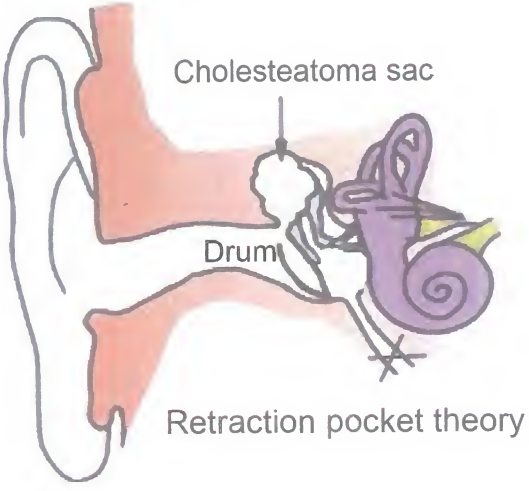
2- Acquired Cholesteatoma:

a- Primary acquired cholesteatoma:

- 1ry means not preceded by otitis media.

- Causes:

*Retraction pocket theory: prolonged ET obstruction → -ve ME pressure → invagination of part of the drum forming retraction pocket (the weakest part is the pars flaccida (no fibrous layer) or postero-superior part of the drum. This pocket will be filled with keratin forming cholesteatoma.



b- Secondary acquired cholesteatoma:

- 2ry means preceded by otitis media (i.e. 2ry secondary to safe CSOM).

- Causes:

*Metaplasia theory: Squamous metaplasia of ME mucosa by chronic irritation.
*Migration theory: migration of the epithelium of EAC to ME through perforation.

Clinical picture:

Symptoms:
- Deafness and tinnitus.
- Persistent discharge.

Signs:
(1) Otoscopy:
- Discharge: scanty, purulent, offensive may contain epithelial debris.
- Perforation: marginal (not surrounded by rim of drum all round and reaching to the annulus) or attic in the pars flaccida.
- Retraction pocket may be seen in postero-superior part in early stages of cholesteatoma (during its formation).

- Cholesteatoma itself may be seen as whitish epithelial mass.
- ME mucosa: may show granulations or polyp, which are more common in unsafe CSOM.

(2) Tuning Fork tests:

- CHL except if there is erosion of inner ear (labyrinthitis) → mixed HL.

Investigations:

1- PTA (Pure tone audiometry).
2- Culture and sensitivity of discharge.
3- CT: If complications were suspected, also it shows bone erosion.

Sequalae of Cholesteatoma:

1-Expansion: due to repeated infection and formation of keratin.
2-Bone erosion: of a- Mastoid lead to natural cavity.
b- Ossicles: lead to hearing loss.

N.B.: The commonest part to be eroded in CSOM is the long process of incus (as it is slender and less vascular).

3-Mastoid sclerosis: it becomes less cellular.
4-Complications may occur.

Treatment:

- The treatment is **surgical.**
- The classic treatment is radical mastoidectomy (see operations).

	Safe CSOM	Unsafe CSOM
Discharge	Intermittent Profuse Mucopurulent Odourless No epithelial debris	Persistent Scanty Purulent Offensive (Bone necrosis) May contain epithelial debris
Perforation	Central In pars tensa. 	Marginal or Attic In pars flaccida. 
ME Mucosa	- May be dry - Or congested. - Granulations and polyp are less common.	Usually shows Granulations or polyp.
Complications	Less common	More common.
Treatment	Tympanoplasty	Radical mastoidectomy

N.B.: There are 2 lines for treatment of cholesteatoma: *see operations*
A) Canal wall up (closed) Technique.
B) Canal wall down (open) Technique.

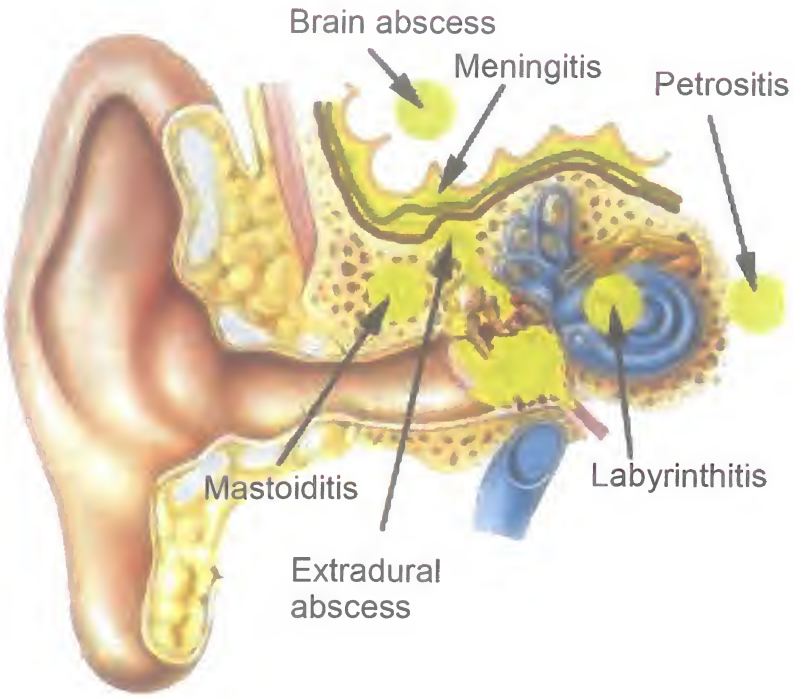
Complications of suppurative otitis media

Extension of infection beyond the muco-perioseal limit of the middle ear cleft.

- **Aetiology:**
  1- AOM especially in infants and children.
  2- CSOM especially cholesteatoma.
  3- Acute exacerbation on top of CSOM.

- **Types:**

I- Cranial complications *(in the bone of the cranium):*
1- Mastoiditis.
2- Labyrinthitis.
3- Petrositis.
4- Facial paralysis.



II- Intra cranial complications:
1- Extradural abscess.
2- Subdural abscess.
3- Meningitis.
4- Brain abscess.
5- Lateral sinus thrombophlebitis.
6- Otitic hydrocephalus.

III-Extra cranial complication:
1- Diffuse otitis externa: secondary to discharge.
2- Jugular vein thrombosis: extension from lateral sinus thrombosis.
3- Bezold's abscess: extension from mastoid abscess.
4- Citteli's abscess: extension from mastoid abscess.

N.B: Warning manifestations of complications in CSOM:
1- Pain.
2- Headache.
3- Fever.
4- Vertigo.
5- Facial paralysis.

N.B: CSOM is never painful except in:
1- Complications.
2- Acute exacerbations.
3- Rarely, malignant transformation.

Important remarks
- *When you suspect a complication, CT should be requested.*
- *More than one complication may be present at a time.*
- *Complications usually occur at the time of exacerbation.*
- *Don't suspect a complication in a dry CSOM.*

Acute Mastoiditis

Acute inflammation of mastoid antrum and air cells with destruction of their bony partitions.

Pathology:

a. Destruction of bony partitions between mastoid air cells → large cavity filled with pus.

b. Extension of infection under the periosteum:

1-Post-auricular (mastoid) abscess: Lateral extension from antrum.

2-Sagging of postero-superior meatal wall: Anterior extension (it is a diagnostic sign).

3-Zygomatic abscess: Lateral extension from zygomatic air cells.

4-Bezold's abscess: Inferior extension along the sternomastoid muscle sheath.

5-Citteli's abscess: Inferior extension along the digastric muscle sheath.

c. Rupture of periosteum and fistula formation.


Mastoid abscess

• Clinical picture:

Symptoms:

General: fever, headache and malaise.

Local:

-Deafness, tinnitus and discharge (of OM).

-Pain: post-auricular (become throbbing on abscess formation).

-Swelling: in abscess formation.

Signs:

-General: High temperature.
Rapid pulse (tachycardia).

-Local:

Ear examination:

* Otoscopy:

- Discharge: profuse and recollect rapidly after suction (It is called Reservoir sign, which is a diagnostic sign).
- Sagging of postero-superior meatal wall (diagnostic sign).
- Perforated drum (may be intact and congested in infants).


Mastoid fistula

Mastoid Examination:

- **Swelling:** either

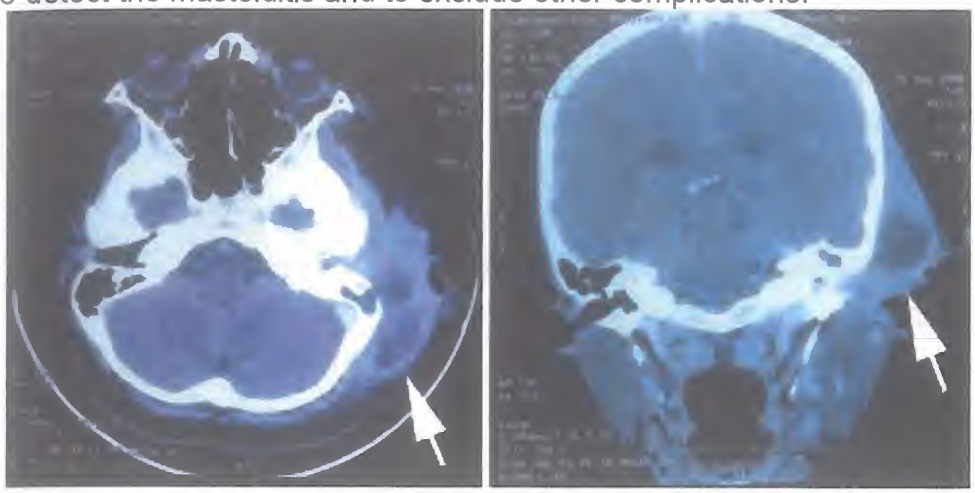
* Post-auricular: pushing the auricle downwards and forwards.
* Zygomatic: above and infront of auricle at root of zygomatic process.
* Bezold's: in upper lateral part of the neck (rare).
* Citteli's: in submandibular region (rare).

-**Tenderness**: over the antrum (marked by cymba concha), tip of mastoid and posterior border (as these are the most superficial air cells).

• Investigations:

- PTA: CHL.
- Culture and sensitivity of discharge.

- X-ray mastoid → clouding (opacity) of mastoid air cells.
- CT → to detect the mastoiditis and to exclude other complications.



CT shows mastoid abscess: Axial view (left) and Coronal view (right)

- **Treatment:**

A) Medical:

-Hospitalization.
-Systemic antibiotics according to culture and sensitivity.
-Analgesic antipyretic.
-Frequent suction of discharge and local antibiotic ear drops.

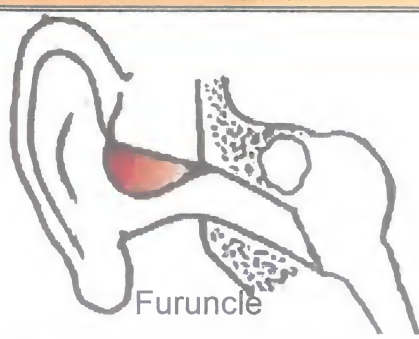
B) Surgical:

Cortical mastoidectomy: if the medical treatment failed (for 48 hours), if there is abscess and if associated with other complication (also myringotomy is needed in children).

N.B.: Differential diagnosis of Mastoiditis

(a) Furuncle:

	Furuncle	Mastoiditis
History:	Scratch	Otitis media
Pain:	On mastication	Not related to mastication
Deafness:	if it occludes the canal (not severe)	Usually present and severe.
Tenderness:	Over the tragus	Over mastoid.
Discharge:	Scanty, purulent and cheesy.	Profuse, Mucopurulent with +ve Reservoir sign.
Swelling:	In outer $^1/_3$ of EAC.	Deep in the posteor-superior part of EAC (Sagging).
Post. auricular groove	Obliterated	Preserved
Drum:	Normal	Usually perforated
X-ray mastoid:	Normal	Clouding of air cells.



(b) Post-auricular lymphadenitis: scalp infection.

Facial Paralysis (due to otitis media)

Aetiology:

A- AOM with dehiscent facial bony canal.
B- CSOM with cholesteatoma eroding the facial canal.

Left facial paralysis

Clinical picture:

Deafness, tinnitus and discharge (of OM) +
LMN (lower motor neuron) facial paralysis of acute onset in AOM and gradual onset in CSOM (Partial or complete): see clinical picture of facial paralysis.

Investigations:

- PTA: CHL
- Culture and sensitivity of discharge.
- CT: to exclude other complications.
- Tests to detect the level of paralysis.

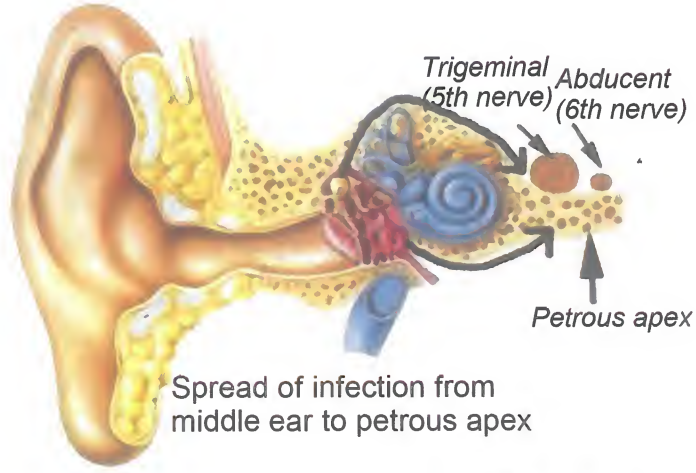
Treatment:

A) Medical:

- Antibiotics (systemic and local).
- Steroid (anti-oedematous to decompress the nerve).

B) Surgical:

Myringotomy in AOM and radical mastoidectomy in cholesteatoma.



Spread of infection from middle ear to petrous apex

Petrositis

Inflammation of the air cells in the petrous apex (present in 30%).

Predisposing factor:

Complications to otitis media in diabetic patients.

Clinical picture:

Gradenigo's triad is characteristic for the diagnosis of petrositis:
-Discharging ear.
-Diplopia and squint (6th nerve affection)
-Facial pain (5th nerve affection).

Investigations:

- PTA: CHL.
- Culture and sensitivity of discharge.
- CT: to detect petrositis and to exclude other complications.

Treatment:

a) Medical:

- Hospitalization and control of diabetes.
- Antibiotics (systemic and local)

b) Surgical:

Radical mastoidectomy and drainage of infected air cells.

Right abducent paralysis

Labyrinthitis


Labyrinthitis

Inflammation of the inner ear.

Pathology:

a) Localized Labyrinthitis:

Bone erosion by cholesteatoma leads to fistula.

The commonest site for fistula is the lat. SCC.

b) Diffuse Labyrinthitis:

1.Serous labyrinthitis: serous fluid in inner ear

2.Suppurative labyrinthitis: pus in inner ear → destruction of neuro-epithelium leads to permanent SNHL.

N.B.: Suppurative labyrinthitis may lead to Meningitis by spread through internal auditory canal. Meningitis is indicated by fever, headache and neck rigidity.

Clinical picture: deafness, tinnitus and discharge (of OM) +

a) Labyrinthine fistula (Localized):

- It may be asymptomatic if small.
- Intermittent vertigo, without nausea or vomiting.
- Nystagmus; rapid phase towards the diseased ear (irritative).
- Positive fistula sign: Vertigo + Nystagmus on
  - . Pressure on the tragus.
  - . ↑ EAC pressure by Seigalization.
  - . Manipulation of aural polyp.

N.B.: The test may be -ve even in the presence of a fistula (false –ve test) if:

- ** The fistula is very small.*
- ** The fistula is closed by cholesteatoma.*
- ** Inadequate sealing of EAC during Seigalization.*
- ** Dead ear.*

b) Serous Labyrinthitis:

- Continuous vertigo with nausea and vomiting.
- Nystagmus; rapid phase towards the diseased ear (irritative).
- Reversible SNHL.

c) Suppurative Labyrinthitis:

As Serous Labyrinthitis but the condition is more severe and the rapid phase of nystagmus is directed towards the normal side (Paralytic), and the SNHL is irreversible.

N.B.: *How to differentiate between serous and suppurative labyrinthitis?*
Retrograde (if SNHL improved with treatment, the condition was serous, if not→ suppurative).

Investigations:

- PTA: Mixed HL (CHL + SNHL) in diffuse labyrinthitis.
- Culture and Sensitivity of discharge.
- CT: to exclude any other complications.

Treatment:

a) Medical:

- Hospitalization with complete bed rest.
- Systemic antibiotics: that cross the blood brain barrier (Chloramphenicol or Cefuruxim).
- Sedatives: Diazepam.
- Antivertigo drugs: Dramamine.
- Antiemetics as Chlorpromazine.

b) Surgical: Radical mastoidectomy to remove the cholesteatoma with:

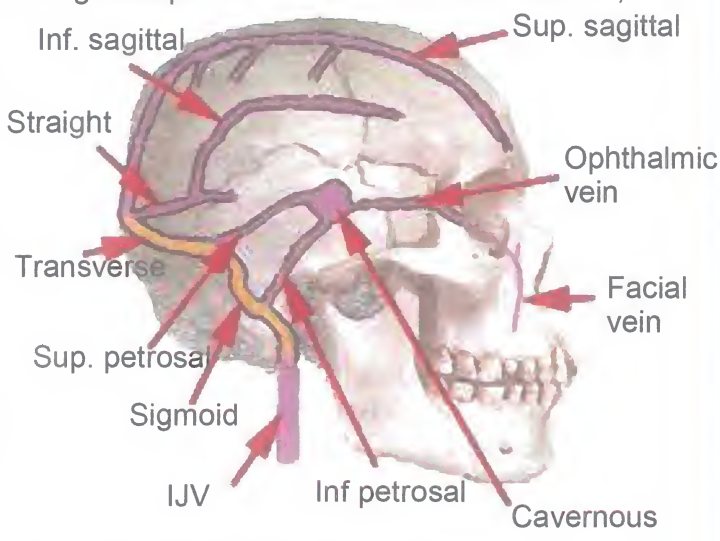
- In fistula: covering it with temporalis fascia graft.
- In suppurative labyrinthitis: Labyrinthectomy.

N.B.: *Serous labyrinthitis will be improved with medical treatment.*

Lateral sinus thrombophlebitis

Thrombosis and infection of lateral venous sinus (sigmoid sinus + transverse sinus).
Pathology: Periphlebitis (infection of perisinus air cells) i.e. around the sinus → Endophlebitis i.e. irritation of intema which become rough → thrombosis which propagate and become infected, may be detached → septic emboli.

Clinical picture:
* Symptoms: Deafness, tinnitus and discharge (of OM) +
1- **Intermittent fever**: Irregular attacks of high temperature due to detached emboli, (accompanied by rigors) which suddenly fall with excessive sweating (in between the attacks → the patient is normal).
2- Pallor: due to anaemia.
* Signs: (of extension)
1-Tender cord like structure along the side of the neck: due to extension to Internal Jugular vein (IJV).
2-Oedema and tenderness over the posterior border of mastoid process: due to extension to mastoid emissary vein, It is called Griesenger's sign.
3-Headache, vomiting and blurring of vision with papilloedema: ↑ ICT due to extension to superior sagittal sinus, it is called Otitic hydrocephalus
4-Proptosis, chemosis, ophthalmoplegia, diminution of vision and oedema of eyelids: due to extension to cavernous sinus.



Investigations:
- PTA → CHL
- Culture and sensitivity of discharge.
- CT with contrast: to show lat. sinus thrombosis and to exclude other complications.
- MRV (Magnatic resonance venography): The most diagnostic.
- Blood picture: a) ↑ WBCs count (leucocytosis)
  b) ↓ RBCs (anaemia)
- Blood culture: +ve if the sample taken during the fever.
- Positive Tobey-Ayer's test: Lumbar puncture needle connected to pressure manometer, then pressure on IJV of diseased side (thrombosed) → no elevation of CSF pressure. While pressure on IJV of normal side (patent) → elevation of CSF pressure.

Differential Diagnosis:
- Malaria: characterized by regular attacks, leucopenia, parasite in blood film.
- Other intracranial complications: characterized by persistent fever.

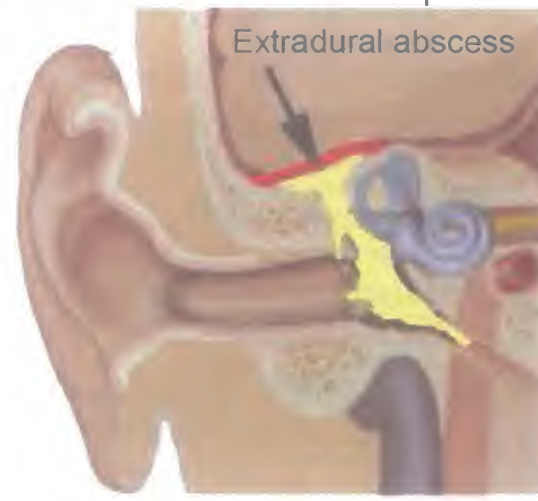
Treatment:
a) Medical:
- Hospitalization.
- Systemic antibiotics and Antipyretic (for fever).
- Anticoagulant: given after removal of thrombus or if there is cavernous sinus thrombosis.

b) Surgical:
Radical mastoidectomy with removal of thrombus and ligation of IJV.

Extradural abscess

Collection of pus between the dura and bone.

Pathology: The dura is covered with granulation tissue. It is either in middle or posterior cranial fossa.



Clinical Picture:

Deafness, tinnitus and discharge (of OM) +
- Asymptomatic: discovered during surgery.
- Ipsilateral earache or headache.
- Low-grade fever.
- Pulsating ear discharge.

N.B.: *Differential diagnosis of pulsating ear discharge:*
- *AOM (after perforation)*
- *Acute exacerbation of CSOM.*
- *Extradural abscess.*

Investigations:
- PTA: CHL
- Culture and sensitivity of discharge.
- CT: If suspected.

Treatment:

a) Medical: Local and systemic antibiotics, and aural toilet.

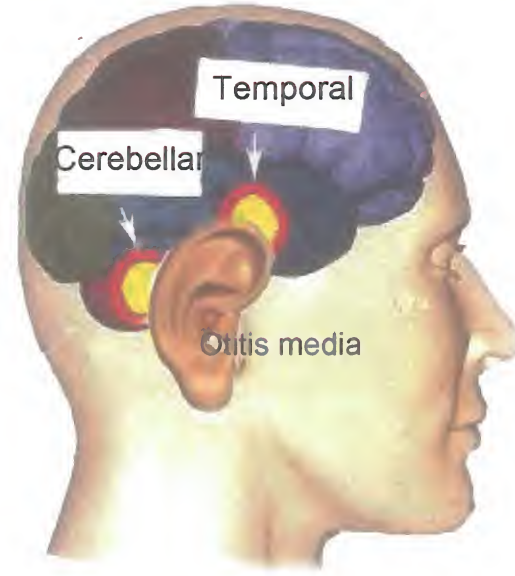
b) Surgical: Drainage of abscess by either:
- Cortical mastoidectomy (in mastoiditis)
- Radical mastoidectomy (in cholesteatoma).

N.B.: The bone should be removed until the healthy dura is exposed all round the abscess. The granulations over the dura should be left intact (no pulling) for fear of CSF Leakage and infection.

Brain abscess (otitic)

Accumulation of pus in an area of the brain.

Causative organism: Mixed infection
- Gram + ve: Stept, staph.
- Gram - ve: pseudomonas, proteus.
- Anaerobes: bacteroids.



Pathology:

-Sites: it is either in
. Temporal lobe (more common).
. Cerebellum (less common but more dangerous).
- Stages:

1- Encephalitis: diffuse inflammation of brain tissue.

2- Localization: formation of abscess cavity surrounded by glial capsule.

3- Enlargement (manifest stage).

4- Terminal stage: either ruptures of the abscess into CSF space → Meningitis, or enlargement to cause herniation of the medulla then coma and death.

Clinical picture:

Deafness, tinnitus and discharge (of OM) +

1-Manifestations of increased intracranial tension (ICT).

* Headache: severe and persistent.
* Vomiting: projectile.
* Blurring of vision.
* Papilloedema.

2-Manifestations of focal neurological defects: caused by pressure of the abscess on the surrounding area (according to its site).

***Temporal lobe abscess**: AHHH

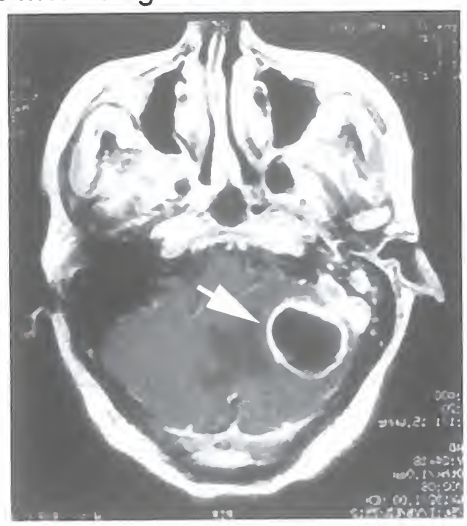
- **A**phasia: due to pressure on speech area (in dominant hemisphere).
- Contralateral **H**emiplegia (Motor area).
- Contralateral **H**emianaesthesia (Sensory area).
- Homonymous **H**emianopia (Optic radiation).

***Cerebellar abscess**: AHMID + NSR.

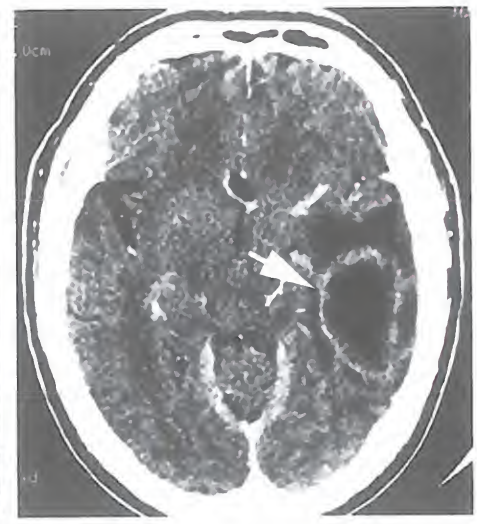
- **A**taxia.
- **H**ypotonia.
- **M**uscle incoordination.
- **I**ntention kinetic tremors.
- **D**ysdiadokokinesia (inability to do fine repeated movements).
- **N**ystagmus.
- **S**taccato speech (interrupted explosive speech).
- **R**omberogism (tendency to fall to the diseased side)

Investigations: either

- **CT** with contrast: to detect the site and size of abscess.
- **MRI**: it is more diagnostic.



MRI: Cerebellar abscess



CT: Temporal lobe abscess

Treatment:

a) Medical:

- Hospitalization.
- Systemic antibiotics: Those cross the blood brain barrier as:
  * Sulphonamide I.V. drips.
  * Chloramphenicol I.V. or I.M.
  * 3rd or 4th generation Cephalosporin I.V. or I.M.
  * Metronidazole I.V. drips: for anaerobes.
- Dehydrating measure (to ↓ ICT): by one or more of the following: Mannitol 20% I.V. drip, Lasix I.V., Glucose 25% I.V. drip, or even repeated lumbar puncture.

b) Surgical:

- Management of abscess by:

* Aspiration through burr hole (trephine) if the abscess wall is thin.
* Excision through craniotomy if the abscess wall is thick.

- Management of CSOM: Radical mastoidectomy (after abscess drainage) to prevent recurrence.

Meningitis

Inflammation of meninges (pia + arachnoid) and CSF (subarachnoid space).

Clinical picture:

Deafness, tinnitus and discharge (of OM)
+

* Manifestations of infection:

Symptoms: fever, headache and malaise.
Signs: high temperature and rapid pulse.

* Manifestations of increased intracranial tension:

- Headache: severe and persistent.
- Vomiting: projectile.
- Blurring of vision.
- Papilloedema.

* Manifestations of meningeal irritation:

Symptoms:

- Restlessness.
- Photophobia.
- Neck rigidity and neck flexion is painful.

Signs:

-Kernig's sign: The patient is asked to lie in the supine position; with hip and knee flexed → He can not do extension (it becomes painful).

Kernig's sign

Brudzinski's sign

-Brudzinski's sign: Flexion of the neck will be accompanied with reflex flexion of hip and knee.

Investigations:

- CT: to exclude brain abscess.
- Lumbar puncture: to take CSF sample for analysis, it should be done slowly in recumbant position.

CSF	Meningitis	Normal
Appearance	Turbid	Clear
Pressure	More than 150 mmH_2O	150 mm H_2O
Cells	Polymorphs	Lymphocytes = 1-5/HPF
Organisms	Present	Absent
Proteins	More than 40mg%	About 40 mg%
Surgar	Less than 80mg%	About 80mg%
Chloride	Less than 750mg%	About 750mg%

Treatment:

a) Medical: the same as brain abscess with nursing of the patient in quite semi dark room (Photophobia).

b) Surgical: treatment of the cause by radical mastoidectomy for cholesteatoma after improvement of the general condition.

Ear trauma

Traumatic rupture of the drum

Traumatic rupture

Aetiology:

1- Indirect trauma:

- Slap: Trauma to ear by the palm of the hand.
- Otitic barotrauma.
- Blast injury (explosion).

2- Direct trauma:

- Self inflected.
- Iatrogenic: during ear wash or removal of FB.
- Fracture base of the skull.

Clinical picture:

* Symptoms: History of trauma with:
- Pain: at the time of rupture.
- Deafness and tinnitus.
- Bleeding: slight (except in fracture base).
- Whistling sound on blowing of the nose.

* Signs:

▪ Otoscopy:

- EAC: may show blood clots
- Drum: shows perforation, which is: central in the pars tensa has thin irregular edge, surrounded by blood clots.

▪ Tuning Fork tests: CHL.

Pathological perforation

Differential diagnosis: from pathological perforation:

	Traumatic	Pathological
* History	Trauma	Otitis media
* Discharge	Absent	Present
* Bleeding	Present	Sometimes present.
* Perforation		
Type	Central	Central, marginal or attic
Size	Small	Any size
Site	Pars tensa	Any where
Shape	Irregular	Regular
Edge	Thin surrounded by clot	Thick and not surrounded by clot.
* ME Mucosa	Normal	May be congested.

N.B. *If traumatic perforation is infected, it is very difficult to differentiate.*

Treatment:

a- Medical (conservative):

Avoid 2: Wetting of ear (i.e. keep it dry).
Blowing of nose.

Give 2: Systemic antibiotics.
Decongestant nasal drops.

N.B.: Spontaneous healing is expected in about one month (except if infected).

Myringoplasty

b- Surgical:

Myringoplasty is indicated after failure of medical treatment for 3 - 6 months.

Otitic barotrauma

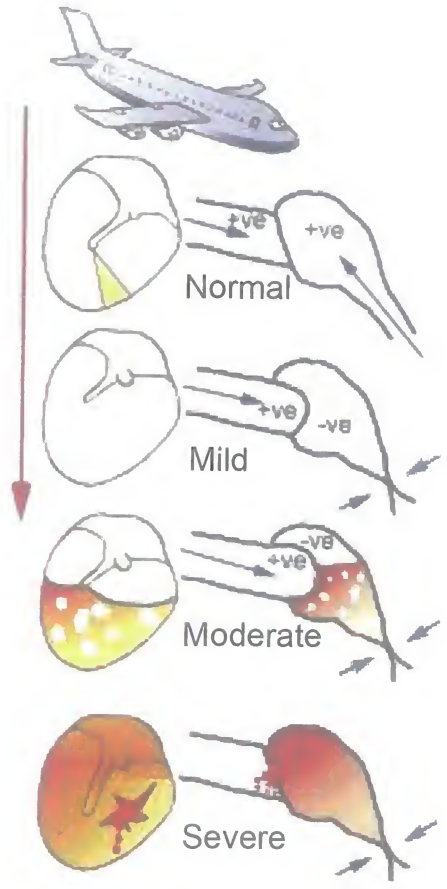
Trauma to the middle ear caused by atmospheric pressure changes in relation to the middle ear pressure.

Predisposing factors:

Eustachian tube (ET) obstruction by:
- Allergic rhinitis, or nasal polyps.
- Common cold.
- Deviated septum.
- Adenoid.

Mechanism:
- Normally the ET allows air to enter middle ear (ME) to equalize pressure on both sides of the drum.
- When the ET close, the drum will retract (-ve pressure in ME) → in mild cases.
-During rapid descent of the airplane, the atmospheric pressure increases and the ME pressure decreases (relative to atmospheric pressure) leading to ME effusion and sometimes bleeding inside the ME (Hemotympanum) → in moderate cases.
- When the ME pressure become severely decreased, it will lead to rupture of the drum → in severe cases.

N.B. The symptoms develop during descent both in flying and in deep sea diving.



Mechanism of otitic barotrauma

Clinical picture:

Symptoms:
- Deafness and tinnitus.
- Pain in the ear.
- Sensation of ear fullness.

Signs: according to the stage.

- Otoscopy:
- Mild cases. ..... Retracted drum.
- Moderate cases..... Effusion in middle ear (or haemotympanum).
- Severe cases ..... Rupture of the drum.

- Tuning Fork: CHL.

N.B. Rarely; the inner ear may be affected in severe cases, oval or round window may rupture resulting in perilymph fistula and SNHL

Treatment:

a. *Prophylactic*:
- Avoid 2:

Flying with nasal obstruction.
Sleep during flying.
- Give 2:

Decongestant nasal drops for nasal obstruction before fly.
Chewing gum.

b. *Curative*:
- In mild cases: Decongestant nasal drops and Valsalva's maneuver to open ET.
- In moderate cases: Myringotomy and drainage.
- In severe cases: Myringoplasty if no healing within 3 - 6 months.

Fracture base of the skull (Temporal bone)

Longitudinal fracture

Transverse fracture

A) Longitudinal fracture:

Incidence: More common (80%) and less dangerous.

Aetiology: Trauma to the side of the head → fracture line passing along the longitudinal axis of petrous bone, through the roof of EAC (lacerations), Drum (rupture) and ossicles (dislocation).

Clinical picture:

- CHL: due to rupture of the drum and dislocation of ossicles.
- Bleeding per ear (lacerations).
- Otoscopy: rupture of the drum and lacerations of EAC.
- Facial paralysis: rare (20%), usually partial and delayed due to compression of the nerve by oedema or haematoma.

B) Transverse type:

Incidence: less common (20%) and more dangerous.

Aetiology: Trauma to the back of the head → fracture line passing perpendicular to the longitudinal axis of petrous bone, through the inner ear and facial canal (paralysis).

Clinical picture: loss of consciousness may be present

-SNHL and vertigo: due to injury of the inner ear.
-Haemotympanum: i.e. bleeding in middle ear with intact drum.
-Otoscopy: the drum is reddish or bluish in colour (due to haemotympanum).
-Facial paralysis: common (50%), usually immediate and complete due to cut of the nerve.

Investigations:

- CT: to detect fracture (bone).
- MRI: to exclude brain injury (soft tissue).

Treatment:

- Hospitalization under complete aseptic condition.
- Systemic antibiotics: Those cross blood brain barrier to prevent infection.
- Steroids: to decrease any brain oedema.
- Surgical management:

a) Of brain injury by neurosurgeon.
b) Of ruptured drum by Myringoplasty.
c) Of dislocated ossicles by ossiculoplasty.
d) Of facial nerve injury: see traumatic facial paralysis.

Tumours of the middle ear

Glomus tumour (Chemodectoma, Paraganglioma)

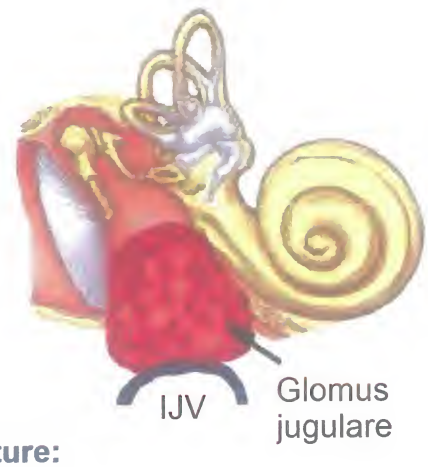
A benign, locally aggressive, highly vascular tumour arises from paraganglionic tissue related to certain nerves in temporal bone.

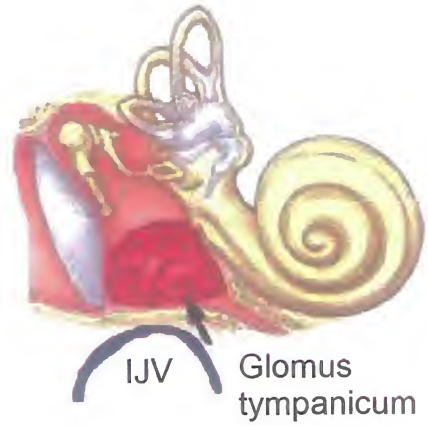
1-Glomus jugulare: more common

It arises in relation to auricular branch of vagus (Arnold's) at the jugular bulb.

2-Glomus tympanicum: less common

It arises in relation to tympanic plexus of glossopharyngeal (Jacobson's) on the promontory.





Clinical picture:

Symptoms:

- Deafness: CHL.
- Pulsatile tinnitus.

*Signs: Sun rising appearance which blanch on siegalization (Brown's sign).

*Cranial nerve paralysis. (Extension)

- 7^{th} → facial palsy.
- 9^{th} → chocking.
- 10^{th} → Hoarseness.
- 11^{th} → Shoulder drop.
- 12^{th} → Tongue paralysis.

*Finally increased intracranial tension.

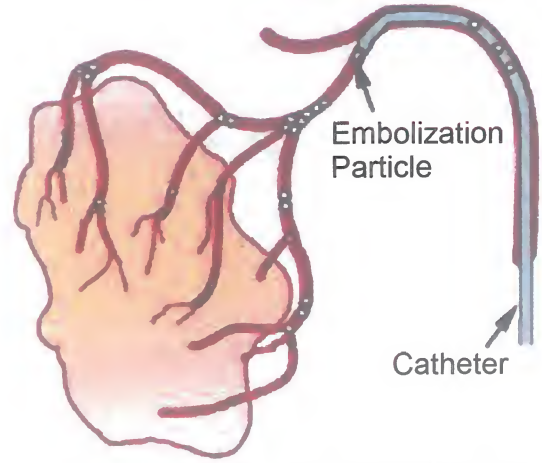
Investigation:

- CT: shows the bone better (wide Jugular foramen).
- MRI: shows soft tissue better (tumour mass).
- **Angiography**: shows the feeding vessel and to do embolization (feeding vessel = ascending pharyngeal artery).

N.B: Biopsy is contraindicated, it results in severe bleeding.

Treatment:

Surgical excision: with pre-operative embolization to decrease bleeding.

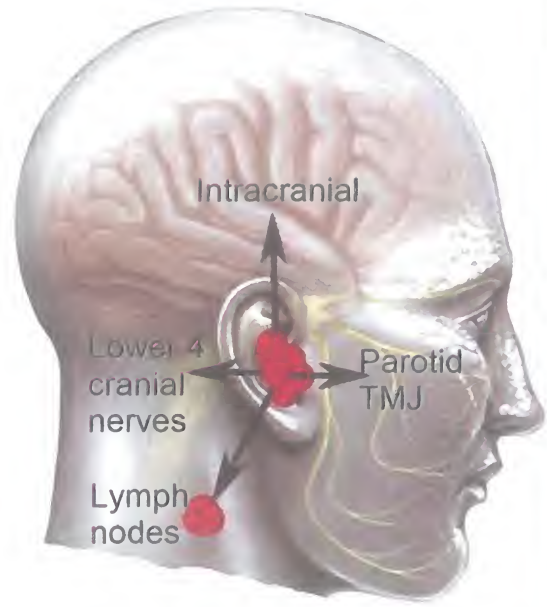


Angiography and embolization

Squamous cell carcinoma of middle ear

It is very rare and occurs on to top of long standing CSOM

Age: More in old (above 60 years).
Sex: more in males.
Predisposing factors:
- Long standing CSOM.
- Irradiation.



Spread of middle ear carcinoma

Clinical Picture:
Manifestations of primary tumour:
Symptoms: Long standing CSOM with change of the characters:
- Pain.
- Bleeding.
- Facial palsy.
- Increase in hearing loss.

Signs: irregular mass which bleeds on touch and may extend to surrounding structures.
Manifestations of local spread:
Parotid swelling and tempromandibular joint (TMJ) fixation
Manifestations of lymphatic spread:
Upper deep cervical lymph nodes enlargement.
Manifestations of blood spread:
It may spread to lung, liver, bone, and brain (LLBB).

Investigations:
- CT: shows bone erosion.
- MRI: shows soft tissue tumour mass.
- Biopsy
- Metastatic work up

Treatment: 3R
Radical mastoidectomy
+ **R**adical neck dissection if lymph nodes metastasis.
+ **R**adiotherapy.

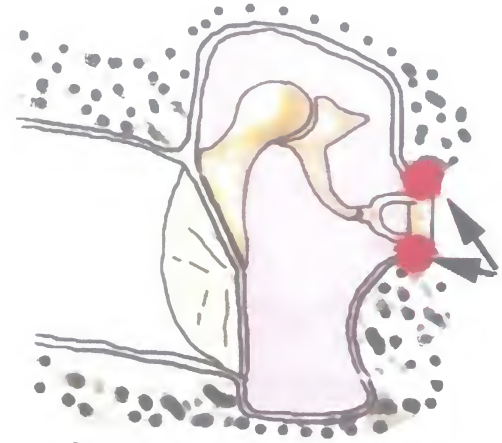
N.B. ***Causes of blue tympanic membrane:***
1- **H**emotympanum.
2- **H**igh Jugular bulb.
3- **C**arotid aneurysm (ICA).
4- **G**lue ear (Secretory otitis media).
5- **G**lomus tumour.

Otosclerosis

Hereditary localized disease of the otic capsule (bony labyrinth) characterized by replacement of normal compact bone by spongy bone (Otospongiosis) of increased cellularity, vascularity and thickness.

Causes: Unknown but may be Hereditary

Types:
1-Stapedial: (it is the commonest type).
Occurs around the footplate of the stapes leading to its fixation (ankylosis) and CHL
2-Cochlear: (rare)
In the cochlea leading to SNHL and vertigo.
3-Mixed (combined): Both.


Otosclerosis: fixation of stapes

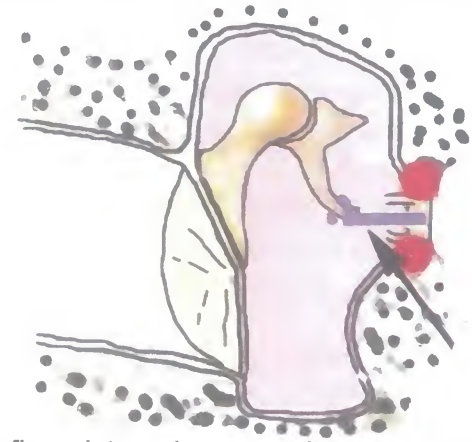
Incidence:
- Usually bilateral (unilateral in 15%).
- More common in females.
- Middle age

Clinical picture:
* Symptoms:
- Deafness: (usually bilateral)
Associated with paracusis willicii phenomenon (i.e. hearing is better in noisy places).
- Tinnitus.
- Vertigo (rare): in cochlear and mixed otosclerosis.
* Signs:
- Otoscopy: normal in most cases, sometimes (rare) the drum may be flamingo-red in colour in the active stage (Schwartz sign).
- Tuning Fork Tests: CHL in stapedial type or SNHL in cochlear type.

Investigations:
- PTA: CHL, SNHL, or Mixed HL.
- Tympanometry: type As curve [normal (A) but stunted (s) curve], due to stiffness of the drum caused by stapedial fixation (see chapter of audiology).
- Acoustic (stapedial) reflex: no response (see chapter of audiology).

Differential Diagnosis: from other causes of CHL with intact drum
1- Osteogenesis imperfecta: CHL, blue sclera, and multiple fractures.
2- Secretory OM, Adhesive OM, congenital stapedial fixation, and tympanosclerosis.

Treatment:
- No treatment:
If the air-bone gap (PTA) is less than 20dB.
- Surgical treatment:
Stapedectomy, it is treatment of choice, removal of stapes and replacement with teflon piston or wire and fat (see operations).
- Medical treatment:
Sodium fluoride, used if
. The operation is contra-indicated.
. SNHL (cochlear type).
. +ve Schwartz sign (↑ Vascularity).
- Hearing aid: in severe SNHL.


Teflon piston placement in stapedectomy

Diseases of the inner ear and vestibulo-cochlear nerve

Congenital

Cochlear aplasia (Michel's malformation): no cochlea

Cochlear hypoplasia (Mondini's malformation): the cochlea is 1½ turns.

Traumatic

Acoustic trauma (Noise induced hearing loss)

Perilymph fistula (as in fracture base or post-surgical as after stapedectomy).

Inflammatory

Labyrinthitis

Vesibular neuritis

Neoplastic

Acoustic neuroma

Miscellaneous

Meniere's disease

Cochlear otosclerosis

Ototoxicity

Senile deafness (Presbyacusis).

Benign paroxysmal positional vertigo (BPPV)

Acoustic trauma (Noise induced hearing loss)

Types of noise:

- Sudden exposure to loud sound as explosion and gunfire
- Prolonged exposure to loud sound as produced by machines, traffics and music.

The sound that can cause trauma to the cochlea is usually above 90dB.

Types of hearing loss: either

- Temporary threshold shift: hearing recovers within hours to days.
- Permanent threshold shift: hearing does not return to the normal level.

Treatment: it is a preventable rather than a curable illness.

- Avoid exposure to loud sounds.
- Personal hearing protection: wearing earplugs, earmuffs on exposure to loud sounds.
- Hearing aid in severe cases.

Labyrinthitis

Viral labyrinthitis:

Measles, Mumps, Cytomegalovirus and Rubella.

Bacterial labyrinthitis:

- Infection from middle ear (Otogenic labyrinthitis): as a complication to OM.
- Infection through the internal auditory canal: as a complication to meningitis.
- Syphilitic labyrinthitis: causes secondary endolymphatic hydrops with clinical picture similar to Meniere's disease but with syphilitic stigmata as Hutchinson's teeth and interstitial keratitis.

Presbyacusis (Senile SNHL)

It is an age related SNHL that occurs in old age.

Causes:

Degeneration of hair cells, cochlear nerve fibers, stria vascularis and/or stiffness of the basilar membrane.

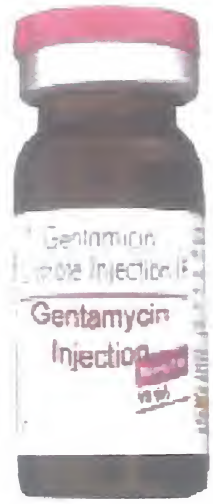
Clinical picture:

Bilateral progressive symmetrical SNHL with tinnitus in elderly without evident cause.

Treatment: Hearing aid

Ototoxicity

Damage of hair cells of the inner ear (mainly the outer) by medications.



Types of medications:

- Aminoglycosides: as gentamycin, kanamycin and streptomycin.

They cause permanent cochlear and vestibular damage.

- Salicylates (Aspirin): cause reversible cochlear damage.
- Diuretics: as frusemide and ethacrynic acid.

They cause temporary cochlear damage.

- Quinine (antimalaria): causes reversible cochlear damage.
- Chemotherapeutics (cytotoxic drugs): as cisplatin.

They cause permanent cochlear and vestibular damage.

Clinical picture:

Bilateral SNHL (mainly high tone) with tinnitus

Treatment:

- Prevention: by monitoring the auditory function for patients taking ototoxic drugs.
- Hearing aid.

Vesibular neuritis

Acute functional failure of the vestibular nerve; most probably caused by viral infection.

Clinical picture:

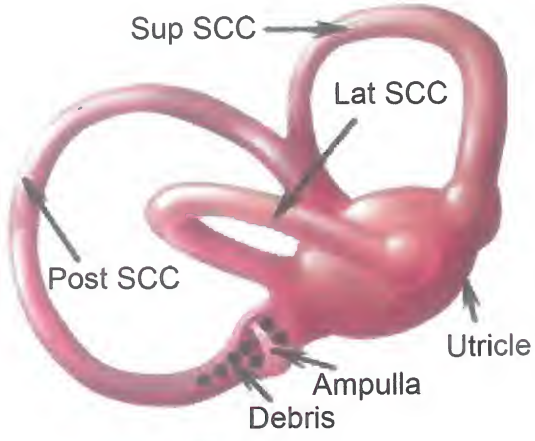
Acute onset of severe vertigo associated with nausea and vomiting without hearing problems (no cochlear affection). The condition lasts few days to few weeks.

Treatment:

Antivertigo drugs in the first few days as a symptomatic therapy
Steroids (in tapering method) as anti-inflammatory (no role for antiviral drugs)
Vestibular exercise

Benign paroxysmal positional vertigo

BPPV is characterized by paroxysmal attacks of vertigo of sudden onset and short duration (few seconds) related to certain positions. It is a common cause of vertigo.



Causes:

Debris of sequestrated otoconia present in the posterior SCC, it is displaced from the sensory end organ of the utricle (macula). It may be due to head trauma.

Clinical picture:

Sudden onset of vertigo and nystagmus for few seconds (10-20 seconds) without hearing problems (no cochlear affection) with +ve Dix-Hallpike test.

Dix-Hallpike test:

While the patient is sitting on the examining bed, turn his head 30° towards the examiner, then he lies down till his head just below the bed level. Positive test shows nystagmus and reversal to the upright position changes the direction of nystagmus.

Dix-Hallpike test

Treatment:

- Repositioning of the debris to the utricle by Epley maneuver.
- Obliteration of the posterior SCC or singular nerve neurectomy if Epley's method failed.

Meniere's disease (Endolymphatic hydrops)

Distension of the membranous labyrinth with endolymph, characterized by recurrent attacks of ***vertigo***, ***deafness*** *and* ***tinnitus***.

Causes: It is due to either excessive formation of endolymph (by stria vascularis) or lack of its drainage (by endolymphatic sac).
-The exact cause is unknown but may be:

1- Autoimmune.
2- Viral infection.
3- Allergy.
4- Salt and water retention.
5- Sympathetic overtone.

Normal labyrinth

Distended labyrinth

Incidence:
-Usually unilateral (bilateral in 25%).
-Equal in males and females.
-Around the age of 50 years.

Clinical Picture:
Recurrent attacks of the following triad:
- Vertigo:
. Lasts few minutes to few hours.
. Inbetween the attacks → the patient is normal
. Associated with nausea, vomiting and nystagmus.
- Deafness: SNHL (low tone), which is flactuant, associated with hypersensitivity to loud sound (+ve Recruitment)
- Tinnitus.

Investigations:
1- Audiological:
. PTA (fluctuant SNHL, mainly in low tone)
. Glycerol test is +ve (glycerol is diuretic): hearing is better (PTA) after intake of glycerol.
. Electrocochleagraphy: may be helpful (see chapter of audiology).
2- Vestibular:
Caloric test shows reduced caloric response on affected side (done after the attack).

Treatment:
- Medical treatment:
A- During the attack:
- Complete bed rest.
- Antivertigo drugs: as Dramamine.
- Antiemetics as chlorpromazine.
B- In between the attacks:
- Salt restriction.
- Diuretics as frusemide (lasix)
- Vasodilator: Betahistidine
- Streptomycine (medical labyrinthectomy): in toxic doses (in bilateral severe SNHL).

Sac decompression

- Surgical treatment:
- If hearing is bad → Intra-tympanic injection of aminoglycoside or surgical labyrinthectomy.
- If hearing is good → Endolymphatic sac decompression (removal of bone around the endolymphatic sac), and if failed vestibular neurectomy (cutting the nerve) is performed.

Acoustic neuroma (Vestibular schwannoma)

A Benign tumour arises from Schwann cells of the vestibular nerve.

Site:
It arises in the cerebellopontine angle (CPA) at the glial-neurolemmal junction of the vestibular nerve.

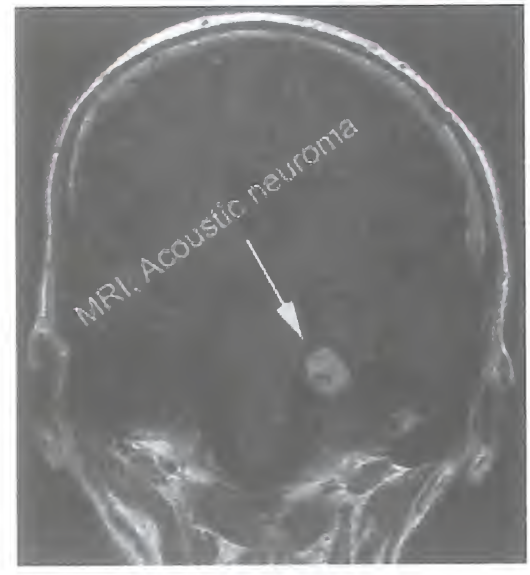
Acoustic neuroma

Clinical picture:
1- Otological manifestations:
- Deafness: SNHL (unilateral)
- Tinnitus: (unilateral)
- Vertigo: (Rare)

2- Neurological manifestations:
- Trigeminal (5^{th}) → loss of corneal reflex (1^{st} sign)
- Facial (7^{th}) → rare and late.
- 9^{th}, 10^{th}, 11^{th}, 12^{th} → as before.

3- Cerebellar manifestations:
Nystagmus, ataxia and staccato speech

4- Terminal manifestations:
Increased intracranial tension (late).



Investigations
- PTA: SNHL (Unilateral)
- Speech audiometry: poor speech discrimination.
- ABR: delayed wave V (see audiology).
- CT with contrast: widening of internal auditory meatus
- **MRI**: the best diagnostic investigation, it shows even very small tumour.

Differential diagnosis of CPA lesions:
- Acoustic Neuroma: the commonest.
- Meningioma.
- Congenital cholesteatoma.
- Arachnoid cyst

Treatment:
- Surgical excision.
- Stereotactic radiosurgery (Gamma knife): in small tumour.

Stereotactic radiosurgery

N.B: *Acoustic neuroma is usually unilateral but it may be bilateral in cases of multiple neurofibromatosis.*

Cerebellopontine angle (CPA):
It is the space between the cerebellum and pons. It contains the facial and vestibulo-cochlear nerves.
Passing in its roof the trigeminal nerve and in its floor the lower four cranial nerves.

The Facial nerve

Anatomy:

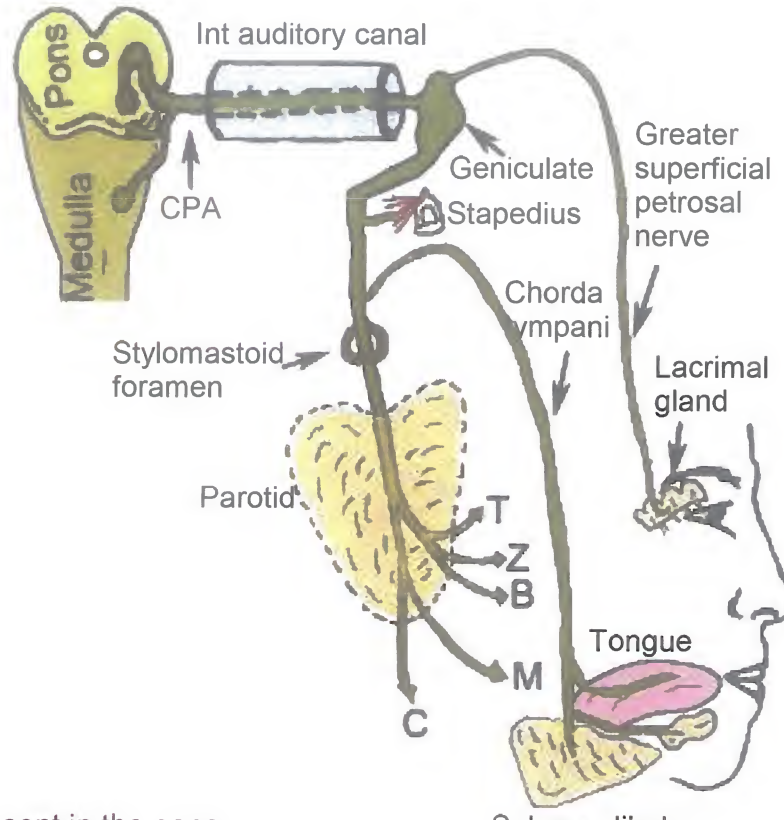
It is the motor nerve of the face.

Types of nuclei and fibers:

1-Motor nucleus: supplied from the motor area of the opposite hemisphere and gives motor supply to facial muscles and stapedius.

2- Superior salivary nucleus: gives secreto-motor fibers to the lacrimal gland by greater superficial petrosal and to the submandibular and sublingual salivary glands by chorda tympani.

3- Nucleus of tractus solitarius: gives taste fibers to anterior $^{2}/_{3}$ of tongue by chorda tympani.



Course:

- The motor facial nucleus present in the pons.
- The fibers pass from the nucleus and turn around the 6th nucleus.
- It leaves the pons at its lower border to the cerebellopontine angle (CPA) accompanied with the 8th nerve (vestibulo-cochlear).
- It enters the internal auditory canal (IAC) with 8th nerve = Labyrinthine segment.
- It forms the geniculate ganglion, then turns backwards *(1st genu)* to pass horizontally in the medial wall of middle ear above the promontory in the fallopian canal (facial bony canal) = Tympanic segment.
- It reaches the posterior wall of middle ear and turns downwards above the oval window *(2nd genu)* and pass vertically in the mastoid = Mastoid segment.
- It leaves the skull through the stylomastoid foramen passing downwards and forwards.
- It enters the parotid to terminate as 5 branches.

Branches:

1-Greater superficial petrosal nerve (GSPN): from geniculte ganglion, it is secretomotor to lacrimal gland.

2-Nerve to stapedius: supplying the stapedius muscle (from mastoid segment).

3-Chorda tympani: supplying the anterior $^{2}/_{3}$ of tongue (taste) and secreto-motor to submandibular and sublingual salivary glands (from mastoid segment).

4-Nerve to stylohyoid and posterior belly of digastric: at stylomastoid foramen.

5-Nerve to occipital belly of occipito frontails: at stylomastoid foramen

6-Five terminal branches within the parotid gland:
- Temporal
- Zygomatic
- Buccal.
- Mandibular.
- Cervical.

7-Sensory fibers to the posterior part of EAC.

Facial nerve paralysis

Aetiology:

A) Upper motor neuron lesion (UMNL): above the level of the nucleus i.e. central

- Traumatic: Head trauma.
- Inflammatory: Meningitis - encephalitis.
- Vascular: Thrombosis, haemorrhage, or embolism (THE).
- Neoplastic: brain tumour.
- Degenerative: Multiple sclerosis.

B) Lower motor neuron lesion (LMNL): at or below the level of the nucleus.

1- Pontine lesions: i.e. nuclear (as central causes)

2- CPA lesions:

- Acoustic neuroma.
- Meningioma.
- Congenital cholesteatoma.
- Arachnoid cyst.

3- Cranial (Otogenic) lesions:

i.e. in the temporal bone ***(TITI)***

* ***Idiopathic:*** Bell's plasy (the commonest cause).
* ***Traumatic:***

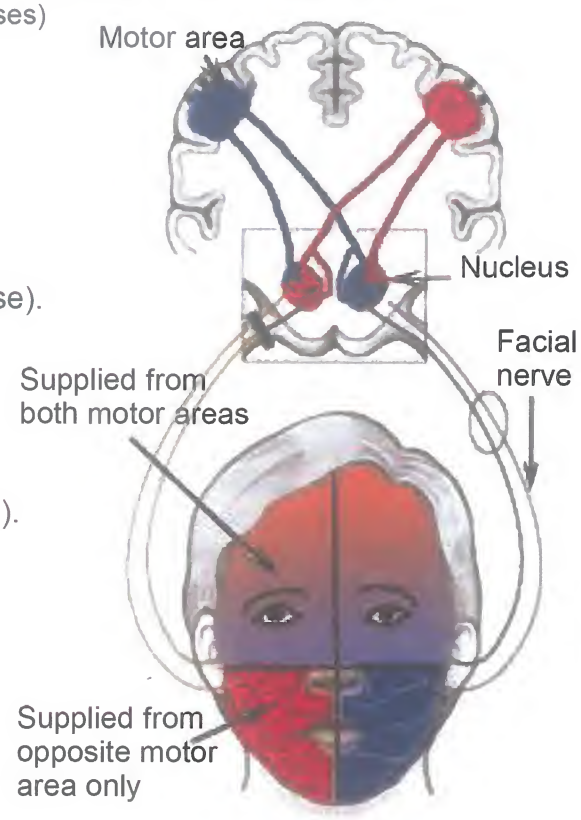
- Surgical: ear operations.
- Accidental: fracture base.

* ***Inflammatory:***

- AOM (in dehiscent facial canal).
- CSOM (in cholesteatoma eroding facial canal).
- Malignant Otitis Externa.
- Ramsay Hunt syndrome.

* ***Tumour:***

- Glomus.
- Squamous cell carcinoma of middle ear.
- Acoustic neuroma.



4- Extracranial (TIT):

* ***Traumatic:***

- Surgical → parotid surgery.
- Accidental → stab in parotid.

* ***Inflammatory:*** Sarcoidosis.
* ***Tumour:*** parotid tumour.

5- Miscellaneous:

- Peripheral neuritis.
- Guilliane- Barre syndrome: ascending polyneuritis.
- Milkersson Rosenthal syndrome: It is a familial facial paralysis with facio-labial oedema, and fissured tongue.

Clinical picture: of LMNL

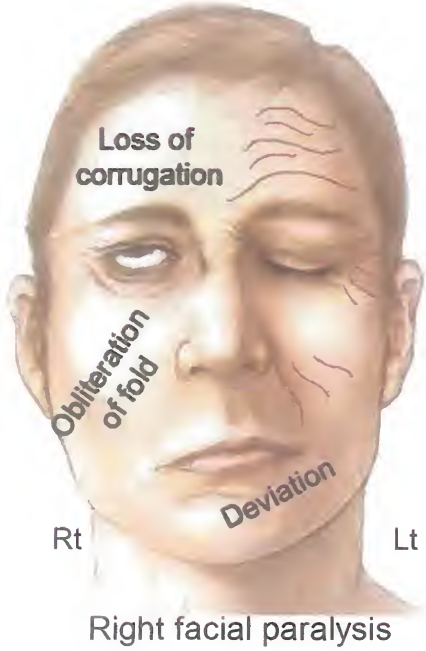
Symptoms:

- Inability to close the eye (on affected side)
- Deviation of mouth (to the healthy side)
- Accumulation of food behind cheek (on affected side).

Signs:

* Inspection:

- Loss of corrugation of forehead (on affected side).
- Obliteration of nasolabial fold (on affected side).



Right facial paralysis

- Deviation of Mouth (to healthy side).
- Drippling of saliva (on affected side).

* Motor power:
- Inability to elevate eye brow (Frontalis).
- Inability to close the eye (orbicularis oculi).
- Inability to whistle and to blow (Buccinator and orbicularis oris).
- Inability to show the teeth (Retractor anguli).

***N.B.:** Difference between UMNL and LMNL:*

	UMNL	LMNL
Site of paralysis	※Lower $^1/_2$ of face (Opposite side).	Upper $^1/_2$ + Lower $^1/_2$ of face (same side) i.e. total facial paralysis.
Emotional movement	Present	Absent
Muscle tone	Increased	Decreased
Hemiplegia	Present	Absent

※This is because the upper $^1/_2$ of the face is bilaterally represented.

N.B.: Detection of the level of paralysis (Topographic diagnosis):

1-UMNL → paralysis of lower 1/2 of face on the opposite side with hemiplegia.

2-LMNL → total facial paralysis on the same side without hemiplegia **with:**

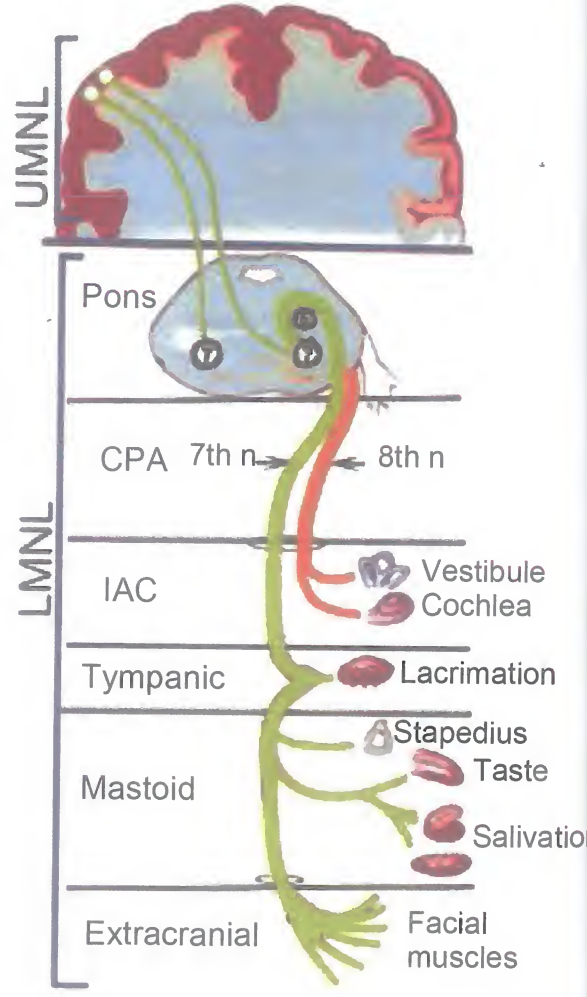
a) Pontine (nuclear):
- 6th nerve paralysis (squint).
- Pontine manifestations.
- Lacrimation, taste and salivation are normal (other nuclei).
- Stapedial reflex is lost (motor nucleus).

b) CPA and internal auditory canal (IAC):
- 8th nerve paralysis (SNHL+vertigo).
- Lacrimation, taste, salivation and stapedial reflex are lost.

c) Geniculate ganglion:
Lacrimation, taste, salivation and stapedial reflex are lost.

d) Below the Geniculate:
- Lacrimation is normal.
- Taste, salivation and stapedial reflex are lost.

e) Extacranial:
Lacrimation, taste, salivation and stapedial reflex are normal.



Investigations:

- Radiological investigations:
CT: shows fracture line in traumatic cases.
MRI: shows a mass in tumour cases.

- Audiological investigations:
PTA → if there is associated ear lesion.

- Leveling investigations:
Schirmer's test: to detect lacrimation.
Taste sensation: from anterior $^2/_3$ of tongue
Stapedial reflex.
Submandibular salivary flow test.

- ***Electrophysiological tests:*** to detect degeneration early.
(a) Nerve excitability test (NET): If the difference between both sides exceeds 3 mAmp. → Bad prognosis. (The muscle contraction is seen by the eye).
(b) Electroneurography (ENOG): the same as above but the muscle contraction is detected on a graph.
N.B.: *NET and ENOG are of no value in the first 3 days of paralysis.*
(c) Electromyography (EMG): normally, stimulation of a muscle leads to its contraction (action potentials). If the muscle is degenerated → fibrillation potentials, and if the muscle is reinnervated → polyphasic potentials (it occurs 2 months before clinical recovery, so it is a prognostic test).
N.B.: *EMG is of no value in the first 3 weeks of paralysis.*
N.B.: *NET and ENOG: stimulation of the nerve and detection of muscle contraction, while EMG: stimulation of the muscle.*


EMG

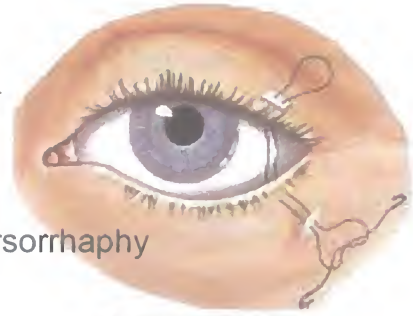
Results of facial paralysis:
1-Contracture: fibrosis of muscles.
2-Cross innervations: due to disarrangement of the regenerating fibers lead to:
(a) Crocodile tears: lacrimation during eating.
(b) Synkinesis: voluntary movement of a muscle will be accompanied with involuntary movement of another muscle.

Pathology of facial nerve injury:
- **Neuropraxia:** just compression of the nerve (Reversible conduction block).
- **Axonotemesis:** interruption of the axon with still intact end-neurium.
- **Neurotemesis:** interruption of the axon and endo-neurium.

General management of facial paralysis:

1- Psychological reassurance:
Especially in cases of Bell's palsy.

2- Care of the eye: to prevent keratitis:
- Eye drops and artificial tears by day.
- Dark glasses in outdoors.
- Eye ointment by night.
- Lateral tarsorraphy in prolonged cases.


Tarsorrhaphy

3- Care of facial muscles:
- Massage of facial muscles.
- Physiotherapy.
- Facial exercise when the movements start to reappear.

4- Treatment of the cause.

5- Rehabilitation:
(a) Dynamic: The muscles are still viable.
- End to End anastomosis: if there is narrow gap.
- Nerve graft: if there is wide gap, the graft is taken from greater auricular nerve or sural nerve.
- Hypoglosso-facial anastomosis.

(b) Static:
the muscles are fibrosed i.e. cosmetic. e.g. by temporalis muscle transposition.


Facial exercises

Idiopathic facial paralysis (Bell's palsy)

- It is the commonest cause (90%).
- **Aetiology:** unknown but different theories.

- Vascular theory: Exposure to cold air draughts → spasm of vasa nervosa → ischaemia of the nerve → oedema (due to metabolite accumulation) and compression of the nerve in its canal.

- Viral theory: Herpes simplex or zoster without vesicles

- Auto immune.

- **Clinical picture:**

- Diagnosed by exclusion of all other causes.
- LMNL (symptoms + signs), of sudden onset, partial or complete.
- Pain behind the ear: hours before paralysis.
- Red chorda tympani (rare): seen through the drum

Bell's palsy

- **Investigations:** as discussed before.

N.B.: If there is no recovery within 6 months, we should do MRI to exclude any tumour.

- **Treatment:**

- General: Reassurance, Care of the eye, Care of facial muscles (as before).
- Medical:

Steroids (in large dose): 60-80mg/day decreased gradually (to avoid adreno-cortical insufficiency), it is called medical decompression (anti- oedematous).

- Surgical:

Decompression of facial nerve by deroofing of the facial canal (↓ oedema). It is indicated if the degeneration is more than 90% within 2 weeks (By ENOG).

Traumatic Facial Paralysis

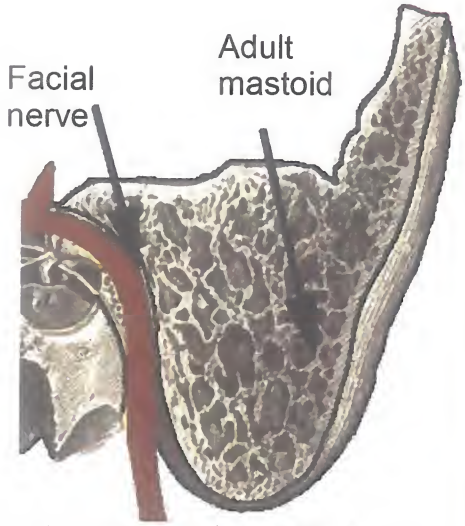
- **Types:**

(A) Surgical trauma:

1- CPA surgery: during removal of CPA lesions.

2- Ear surgery:

-Post auricular incision: especially in children (small mastoid and superficial nerve), so we do high oblique incision (wild's incision) in children.
-Cortical mastoidectomy.
-Tympanoplasty.
-Radical mastoidectomy.
-Stapedectomy (if the facial canal is dehiscent).



3- Parotid surgery: during removal of parotid tumour.

(B) Accidental trauma: fracture base of the skull.

1- Longitudinal: the paralysis is partial and delayed (due to compression of the nerve by oedema). Associated with CHL.

2- Transverse: the paralysis is complete and immediate (due to cutting of the nerve). Associated with SNHL and vertigo.

- **Investigations:** CT: to detect fracture line.
- **Treatment:**

(a) If the paralysis is immediate and complete: Immediate exploration with end to end anastomosis (narrow gap), or nerve graft (wide gap).

(b) If the paralysis is delayed and partial: Conservative treatment (antibiotics + steroids), if there is no improvement within 2 weeks → Surgical exploration.

Symptomatology

Deafness

Diminution of hearing.

Types:

Conductive Hearing Loss (CHL)
Sensorineural Hearing Loss (SNHL)
Mixed Hearing Loss (MHL)
Psychogenic Hearing Loss

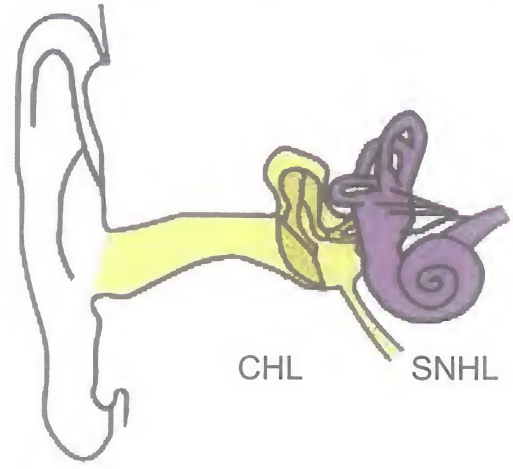
Conductive Hearing Loss (CHL)

Deafness due to lesions in the external and/or middle ear (↓ sound conduction).

Causes:

(A) Causes in EAC:

1- Congenital: Meatal (aural) atresia.
2- Traumatic: FB.
3- Inflammatory: Otitis externa with oedema and obstruction of EAC.
4- Neoplastic: exostosis or carcinoma.
5- Miscellaneous: wax.

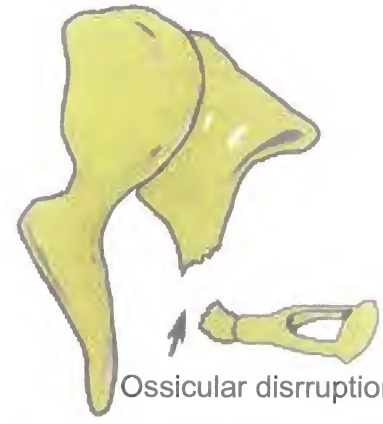


(B) Causes in the drum:

1- Traumatic rupture.
2- Bullous myringitis.

(C) Causes in the Middle ear cavity:

1- Congenital: aplasia or stapedial fixation.
2- Traumatic: fracture base of skull (longitudinal type).
3- Inflammatory: otitis media (OM) which may be:
   a- AOM.
   b- Chronic non-suppurative OM:
   - Secretory OM.
   - Adhesive OM.
   - Tympanosclerosis.
   c- Chronic suppurative OM:
   - Safe (tubotympanic) type.
   - Unsafe (Attico-antral) type i.e. cholesteatoma.
4- Neoplastic:
   a- Glomus tumour.
   b- Squamous cell carcinoma.
5- Miscellaneous: Otosclerosis.



It leads to CHL more than 40 dB

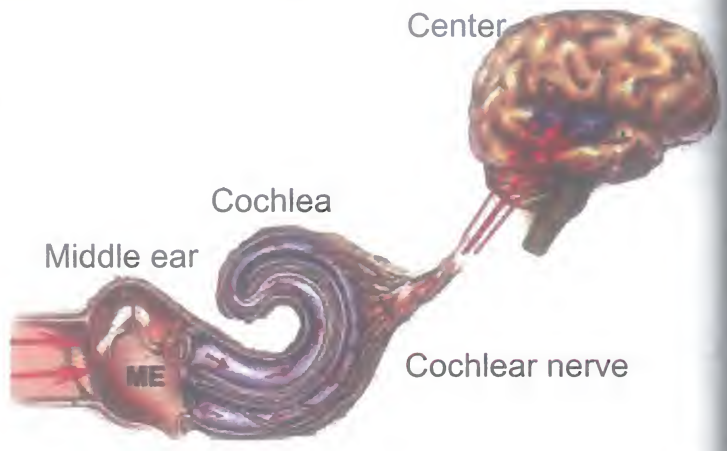
(D) Causes in Eustachian tube:

1- Congenital: Cleft palate.
2- Traumatic: Otitic barotrauma.
3- Inflammatory: Eustachian tube catarrh in common cold.
4- Neoplastic: Carcinoma of nasopharynx causing unilateral secretory OM.
5- Miscellaneous: Adenoid.

N.B. The commonest cause of CHL is wax accumulation.
N.B. The commonest cause of CHL in children is secretory otitis media.

Sensorineural Hearing Loss (SNHL)

Deafness due to lesion in the inner ear (Cochlear) and/or its central connection (Retrocochlear), which is the nerve and the auditory center.



Causes:

I - Peripheral causes:

(A) Cochlear (inner ear) lesions:

1- Congenital: may be

- **Hereditary**: genetic factors
- Syndromic: AUP
  - **A**lport's syndrome: SNHL +Nephritis.
  - **U**sher's syndrome : SNHL + Retinitis pigmentosa.
  - **P**endred's syndrome: SNHL+ Goiter.
- Non-syndromic:
  - Mondini's disease: the cochlea is 1½ turns only.
- **Acquired**: external factors
  - Prenatal: Rubella
    Ototoxic drugs during pregnancy.
  - Natal: Birth trauma.
    Hypoxia.
  - Postnatal: Neonatal jaundice.
    Neonatal infection as meningitis.

2- Traumatic:

a- Physical trauma:
- Acute acoustic trauma: as explosion.
- Chronic acoustic trauma: prolonged exposure to noise.

b- Mechanical trauma:
- Surgical: Perilymph fistula.
- Accidental: Fracture base (transverse type).

3- Inflammatory: labyrinthitis either viral or bacterial

4- Ototoxicity: ototoxic drugs as aminoglycosides, diuretics, salicylates, quinine and chemotherapy.

5- Vascular: thrombosis of internal auditory artery.

6- Miscellaneous:

a- Meniere's disease.

b- Senile deafness (presbyacusis): deafness in old age, due to degeneration of the organ of Corti and/or cochlear nerve fibers.

c- Cochlear otosclerosis: rare.

(B) Cochlear nerve lesions: compression in CPA by

- Acoustic neuroma.
- Meningioma.
- Congenital cholesteatoma.

II- Central lesions:

a- Traumatic: Head trauma.

b- Inflammatory: Meningitis and encephalitis.

c- Neoplastic: Brain tumour.

d- Vascular: THE (Thrombosis, Haemorrhage, Embolism).

e- Degenerative: Multiple sclerosis (MS).

N.B.: Sudden SNHL may occur in traumatic, vascular or autoimmune diseases.

N.B.: The commonest cause of SNHL is presbyacusis.

Mixed Hearing Loss (MHL)

Deafness due to lesions causing conductive and sensorineural hearing loss

Causes:

1- Congenital meatal atresia with inner ear anomaly.
2- Complicated CSOM with labyrinthitis.
3- Combined otosclerosis.

Psychogenic (Hysterical) Hearing Loss

-It affects persons with hysterical personality (subconscious) or malingerer (conscious).
-There is no organic cause in the ear.
-Repeated pure tone audiometry shows varying resposes.
- Auditory brain stem response (ABR) audiometry is helpful in diagnosis.
-Treatment: psychotherapy.

Deafness in Children (Deaf-Mutism)

No good hearing in childhood (deafness) leads to no speech (mutism) especially in the first 3 years of life.

Causes:

(A) Congenital causes: as before.
(B) Acquired causes:
- Infection: as Meningitis, Mumps and Measles (the commonest causes of Deaf-Mutism).
- Ototoxic drugs in children.

N.B. Recurrent bilateral CHL as due to AOM or secretory OM lead to delayed speech development.

Assessment of hearing in children:

Early detection is necessary for early rehabilitation to avoid social and psychological problems

1- Under 2 years

Moro's reflex: The child responds to loud sound by Jerky movement of the body and blinking reflex (it is usually used for children younger than 6 months).

Distraction Method: The child directs his face to the source of sound. The child sits on parent's lap; one examiner sits in front of the child to direct his attention and another examiner behind him to produce sound of particular frequency and intensity.

Visual reinforcement audiometry: using headphones to deliver a unilateral sound. If the child turns his face correctly to sound source then a light or a toy turns on for rewarding.

Play audiometry

2- From 2-5 years

Conditioning method or play audiometry: The child is asked to pick up a toy as a response to sound.

3- Above 5 years:

The child can respond to any type of audiometry and hearing tests as adults.

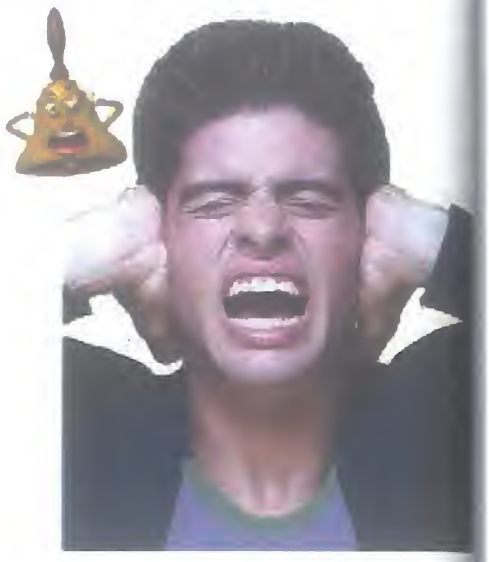
4- At any age (objective tests): see audiology
- Evoked Response Audiometry (ERA).
- Otoacoustic emissions.

Treatment:

Auditory rehabilitation and cochlear implant in selected cases.

Tinnitus

Sensation of a noise in the ear, it is a common illness and difficult to relieve.
It may be continuous or intermittent and more apparent in quiet surroundings.
It is aggravated by fatigue, stress and depression.



Causes:

- Tinnitus with deafness:

-Due to local lesion in the ear.
-Any lesion cause CHL, SNHL and/or MHL can lead to tinnitus.

- Tinnitus without deafness:

a- Subjective: (i.e. heard by the patient only).
- Tempromandibular joint (TMJ) arthritis.
- Impacted wisdom tooth.
- Cervical spondylosis.
- Blood disease: anaemia or polycythaemia.
- Vascular diseases: Hypertension or hypotension.

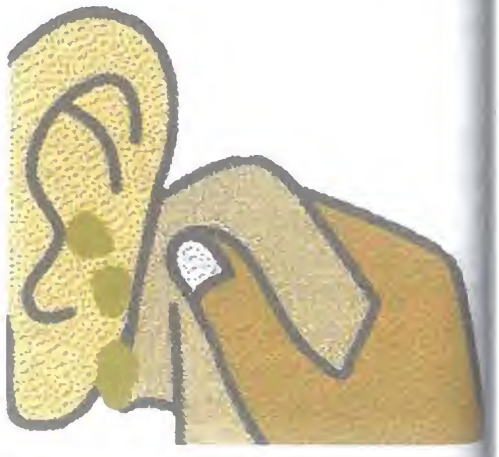
b- Objective: (i.e. heard by the patient and doctor by auscultation).
-Defect in the blood vessels: it causes pulsatile tinnitus
Vascular tumour (Glomus)
Carotid aneurysm.
High Jugular bulb.
-Defect in the muscles:
Palatal myoclonus.
Tympanic myoclonus.

Treatment:

- No specific treatment and the treatment is usually directed to the cause (of deafness or others) and in permanent cases, the patient is informed to tolerate his complaint.
- Psychological reassurance and avoidance of anxiety.
- Tinnitus maskers may help the patient to pay no attention to his tinnitus.

Ear discharge (otorrhoea)

(A) Watery:
CSF otorrhoea due to perilymph fistula either surgical (complication to ear surgery) or accidental (fracture base of the skull).



(B) Mucopurulent:
- AOM (after perforation)
- CSOM (Safe type).

(C) Purulent:
- Otitis externa: Localized and Diffuse.
- CSOM (Unsafe type).

(D) Bloody:
1- Traumatic:
- FB in EAC.
- Rupture of the drum.
- Fracture base of the skull (longitudinal type).

2- Inflammatory: bullous myringitis.
3- Neoplastic: as glomus and squamous cell carcinoma.

Vertigo

Hallucination of movement, subjective sense of motion either of the patient or of the surrounding (i.e. false sense of rotation).

The body balance is maintained by inputs to the brain from 3 areas:

- *Inner ears (Vestibular part).*
- *Eyes.*
- *Proprioceptive organs (especially the neck).*

The diagnosis of the cause of vertigo depends mostly on history much on examination and little on investigations.

The questions to be asked are:

- Characters: recurrent or persistent.
- Duration: seconds (BPPV), minutes to hours (Meniere's disease), days or more (others).
- Associated symptoms:

. Aural symptoms: as deafness (fluctuant or progressive), tinnitus, or discharge.
. Neurological symptoms: loss of consciousness, weakness, numbness or dysarthria.
. Cervical or visual symptoms.

Causes:

1-Physiological:

a- Rotation stimulation
b- Thermal stimulation

2- Pathological: either

a) Peripheral

I- Inner ear (Vestibular):

- Meniere's disease:

Recuurent vertigo (minutes to hours) with flactuant deafness and tinnitus.

- BPPV (benign paroxysmal positional vertigo): it is a common cause

Sudden vertigo (few seconds) related to certain position without deafness.

- Labyrinthitis: viral or bacterial and labyrinthine fistula caused by cholesteatoma.
- Ototoxicity: vestibulotoxic drugs as aminoglycosides and cisplatin.
- Trauma:

Accidental: fracture skull base.
Surgical: post-operative (perilymph fistula).

II- Vestibular nerve:

- Vestibular neuritis: it is a common cause

Acute vertigo (few days); most probably caused by viral infection.

- Cerebellopontine angle lesions (CPA): as acoustic neuroma and meningioma.

B) Central:

i- Inflammatory: Meningitis-encephalitis.
ii-Traumatic: Head trauma.
iii-Vascular: Thrombosis, Hemorrhage, or Embolism.
iv-Neoplastic: Cerebellar tumours.
v- Degenerative: Multiple sclerosis.
vi-Vertebro basilar insufficiency.
vii-Epilepsy.
viii-Lateral medullary syndrome: occlusion of PICA (posterior inferior cerebellar artery)

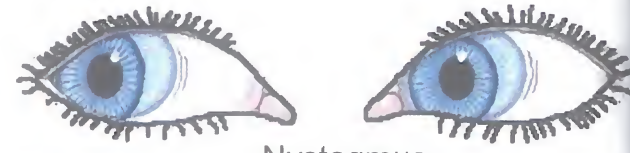
N.B.: *Vertigo is usually associated with nausea and vomiting when severe.*

Investigations of a case of vertigo:
Investigations should include audiological and vestibular tests.
The vestibular investigations are:
- Caloric test.
- Elecronystagmography: caloric test + detection of nystagmus on a graph.
- Fistula test.
- Dix-Hallpike test.
- Rotating chair test.
- Rotating chair test.
- Dynamic posturography.


Dynamic posturogr

Nystagmus:
Involuntary oscillatory eye movement.
Causes:
- Physiological: optokinetic nystagmus.
- Pathological:
  - Ocular → pendular (i.e. the movement is equal in both directions)
  - Vestibular → jerky (i.e. rapid phase to diseased side [irritative], slow to other side)
  - Central → vertical (i.e. vertical movement)

Observed by: either
- Direct looking to the eye.
- Frenzle glasses.
- Electronystagmography.


Nystagmus

Caloric test:
- The patient lies supine with flexed head (30°).
- The ear is washed with cold water (30°) [7 below body temperature].
- Rest for 7 minutes.
- Then the ear is washed with warm water (44°) [7 above body temperature]
- Each wash for 40 seconds.
- Normally nystagmus and vertigo lasts for 90-120 seconds,
If it takes less than 90 seconds = hypo function.
If no response = dead ear.


Caloric test

***N.B. ACTH**: **A**way **C**old, **T**owards **H**eat (direction of rapid phase of nystagmus during ear wash).*

***N.B.: Motion sickness:** Vertigo at motion (car, ship, …. etc).*

Otalgia (Earache)

Pain in the ear, It may be due to local causes in the ear or referred pain.

Sensory nerve supply of the ear:

1) Auricle:

a) Outer surface: Upper $^{2}/_{3}$ by auriculotemporal of trigeminal.
Lower $^{1}/_{3}$ by greater auricular of $C_{2,3}$.

b) Inner surface: Lower $^{2}/_{3}$ by greater auricular of $C_{2.3}$
Upper $^{1}/_{3}$ by lesser occipital of C_{2}.

2) EAC and outer surface the drum:

a) Anterior ½: by auriculotemporal of trigeminal.

b) Posterior ½: by Arnold's branch of vagus.

3) ME mucosa: by Jacobson's branch of glossopharyngeal (tympanic plexus).

Causes:

1) Local causes in the ear:

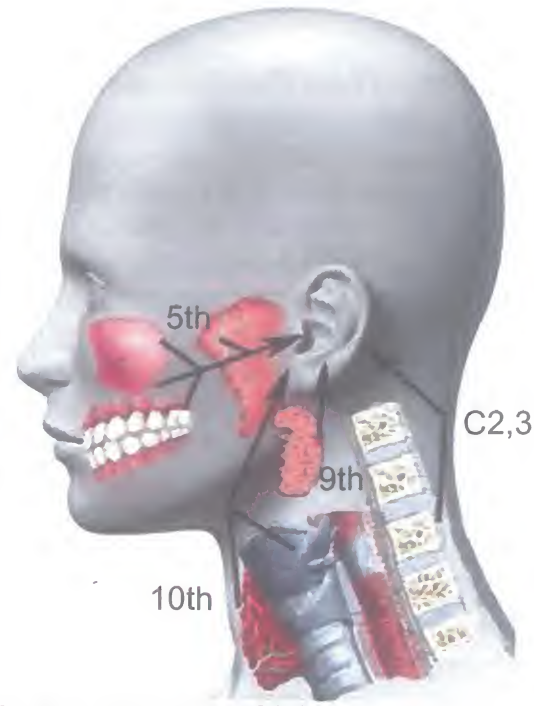
a) Traumatic:

1- Auricle: haematoma.
2- EAC: FB.
3- Drum: Rupture.
4- Middle ear: Fracture base.
5- Eustachian tube: barotrauma.

b) Inflammatory:

1- Auricle: perichondritis.
2- EAC: otitis externa.
3- Drum: bullous Myringitis.
4- Middle ear: AOM before perforation.
5- Eustachian tube: catarrh in common cold.

N.B.: *CSOM is never painful except in: complications, acute exacerbation, or malignant transformation (rare).*



c) Neoplastic:

- Glomus tumour.
- Squamous cell carcinoma (change of character of long standing CSOM).

2) Referred pain: through one of the nerves supplying the ear:

a) 5th (Trigeminal):

- Traumatic: dental extraction and impacted wisdom tooth.
- Inflammatory: dental caries, maxillary sinusitis, parotitis and tempromandibular joint (TMJ) arthritis
- Neoplastic: carcinoma of anterior $^{2}/_{3}$ of tongue.

b) 9th (Glossopharyngeal):

- Traumatic: post-tonsillectomy.
- Inflammatory: tonsillitis and suppurations of the pharynx as quinsy, parapharyngeal and retropharyngeal abscess.
- Neoplastic: carcinoma of the pharynx or tongue base (posterior $^{1}/_{3}$).

c) 10th (vagus):

- Larynx: . Traumatic: laryngeal trauma.
  . Inflammatory: T.B. Laryngitis.
  . Neoplastic: cancer Larynx.
- Cancer thyroid.

d) $C_{2, 3}$ (Cervical plexus): as cervical spondylosis and cervical disc prolapse.

Audiology

Characters of sound:

1- Frequency:

Measured in Hertz (Hz), which is the number of waves/second. It is perceived as pitch.
We can hear in the range between 20 and 20.000 Hz.

2- Intensity:

Measured in decibel (dB), it is the sound loudness.
We can hear in the range between 0 and 140dB.

Tuning Fork tests: Rinne's and Weber's tests were discussed in ear examination.

Audiometry:

Measurement of hearing at different intensities and frequencies by the audiometer.

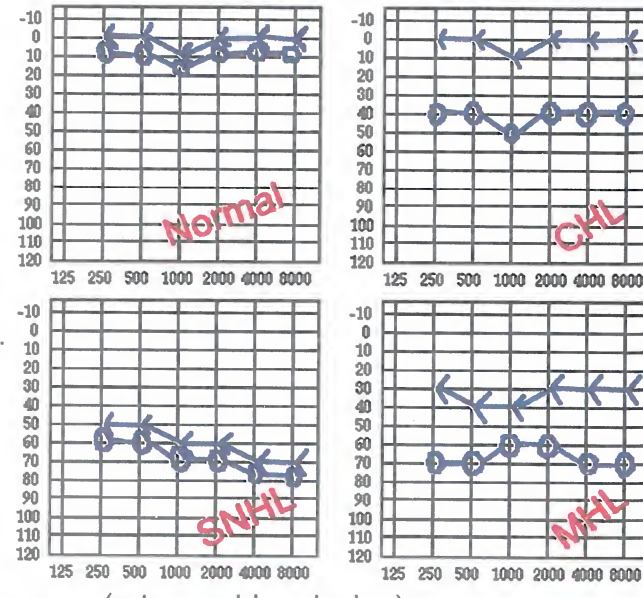
PTA

1) Pure Tone Audiometery (PTA)

- Stimulation of hearing using pure tone signals generated from the audiometer.
- The test is done in a sound- proof room.
- It is done once with ear phone to determine AC (air conduction) and once with vibrator over the mastoid to determine BC (bone conduction).
- Signals of increasing intensity at each frequency are fed to the patient who indicates when the test tone can be heard.
- During the test, the non-test ear should be masked to avoid cross-transmission to it.
- The test is done at frequencies: 125-250-500-1000-2000-4000-6000-8000Hz.

Results: either

a) Normal hearing: both AC and BC range between 0-20 dB (recently considered to 25 dB).
b) CHL: ↑AC threshold + Normal BC threshold (i.e. there is air-bone gap).
c) SNHL: ↑ AC threshold + ↑ BC threshold (i.e. no air-bone gap).
d) MHL: ↑↑ AC threshold + ↑ BC threshold (i.e. there is air- bone gap due to AC threshold is more increased than BC).



Value:
Detection of type and degree of hearing loss, and selection of hearing aid.

Degree of hearing loss (HL):
Normal hearing = 0-25 dB.
Mild HL = 25-40 dB.
Moderate HL = 40-55 dB.
Moderatly-severe HL = 55-70 dB
Severe HL= 70-90, and Profound HL>90 dB.

2) Speech Audiometry:

- Stimulation of hearing using spoken words (speech).
- It measures the ability of each ear to discriminate the spoken word at different intensities.

Value: Poor discrimination in acoustic neuroma (retro-cochlear lesion).

3) Impedance Audiometry:

a) Tympanometry:

Measurement of middle ear pressure through measuring the compliance of the drum.

Results:

- Type A curve: In normal cases
  ME pressure is around 0 (i.e.-100 to + 100 mm H_2O)
  Compliance = 0.5 - 1.75 cc.
- Type B curve: In secretory otitis media (middle ear effusion)
  The curve is flat.
- Type C curve: In Eustachian tube dysfunction
  ME pressure is negative but with normal compliance.
- Type As Curve: In otosclerosis
  ME Pressure is normal but with reduced compliance (i.e. stiffness).
- Type Ad curve: In ossicular chain disruption or dislocation.
  ME pressure is normal but with increased compliance (i.e. hypermobility).

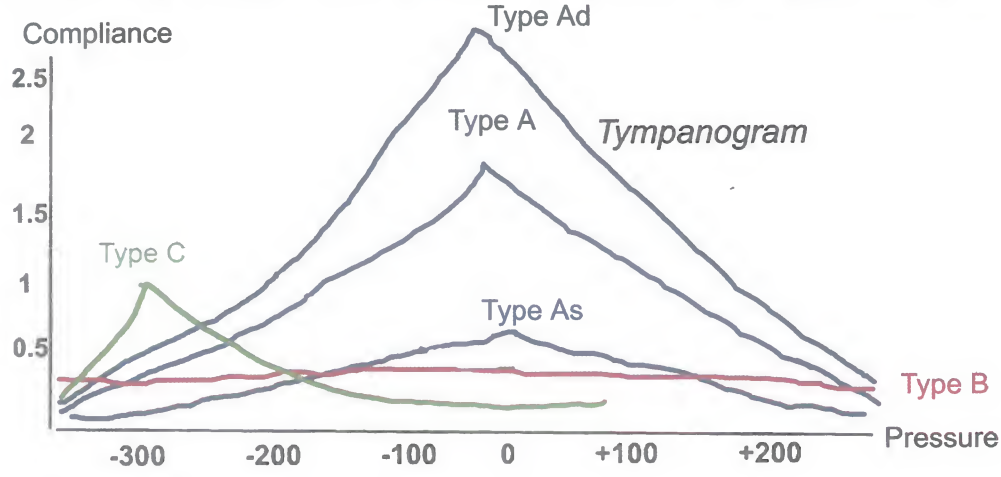
N.B. Oscillating tympanogram: In Glomus tumour.

Uses: To assess Eustachian tube patency
To detect middle ear effusion (secretory otitis media)

b) Acoustic (stapedial) reflex:

Stimulation of hearing by high sound lead to contraction of stapedius and stiffness of the drum (which is measured).

Uses: In otosclerosis: No response (the stapes is fixed).
In leveling of facial paralysis: No response (if the stapdius was paralysed)



4) OtoAcoustic Emissions (OAEs):

Sound produced by the cochlea (outer hair cells) and recorded in the EAC (if the inner ear is healthy).

Uses: Detection of cochlear pathology.

5) Evoked Response Audiometry (ERA):

Recording the electric activity in different parts of auditory pathway in response to sound.

a- ElectroCochleography: Measuring electric activity of the cochlea.

Uses: Meniere's diseases.

b- Auditory Brain Stem Response Audiometry (ABR): Measuring electric activity of the cochlear nerve and brain stem.

Uses: Acoustic neuroma (delayed wave 5).

c- Cortical evoked audiometry.

Hearing rehabilitation

It is important for social and psychological health.

Types of rehabilitation:

Sign language
Lip reading,
Hearing aids,
Cochlear implants,
Brainstem implants.

Behind the ear HA

Hearing Aids (HA)

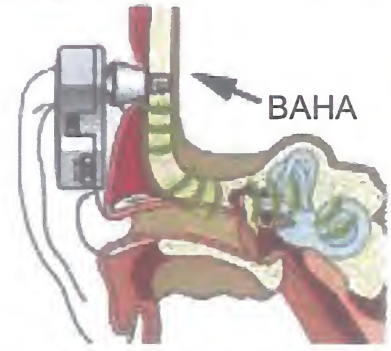
Sound amplification systems helping the deaf patient to overcome his deafness.

Components:

1- Microphone: converts the sound to electric energy.
2- Amplifier: to amplify the electric energy.
3- Receiver: converts electric energy to sound.
4- Power supply.

Types of hearing aids:

1- Air conduction hearing aids:
   Behind the ear.
   In the external auditory canal.
2- Bone conduction hearing aids:
   Bone anchored hearing aids (BAHA).



Indications:

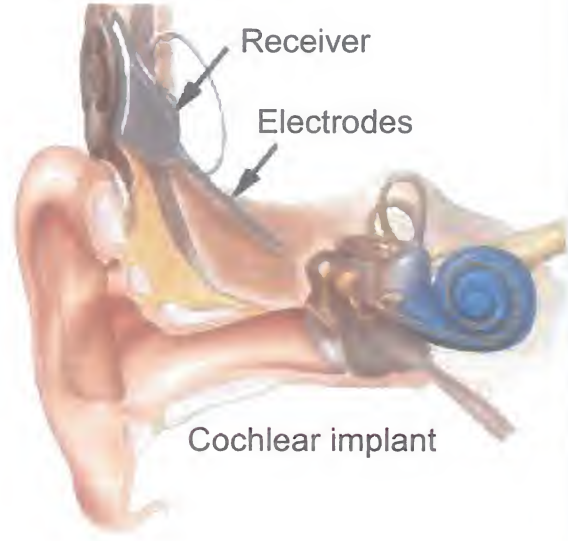
-Congenital aural (meatal) atresia: BAHA is used till the age of surgery (5-6 years)
-Acquired deafness:
. CHL: when the operation is refused or contraindicated.
. SNHL: as presbyacusis and cochlear otosclerosis.

Cochlear Implants

It is a new method for treatment of patients with bilateral profound sensory hearing loss (i.e. the cochlea is not functioning), so we stimulate the cochlear nerve (which is still healthy) by electric method.

Components:

1- External part: Microphone.
   Amplifier
   Speech processor.
2- Internal part: Receiver.
   Multi-channel electrodes.



Cochlear implant

Candidates (patients selected for implant):

1-Pre-lingual:
Hearing was lost before speech development.
2-Post-lingual:
Hearing was lost after speech development.
N.B.: *The Post-lingual patients have better results than the pre-lingual patients.*

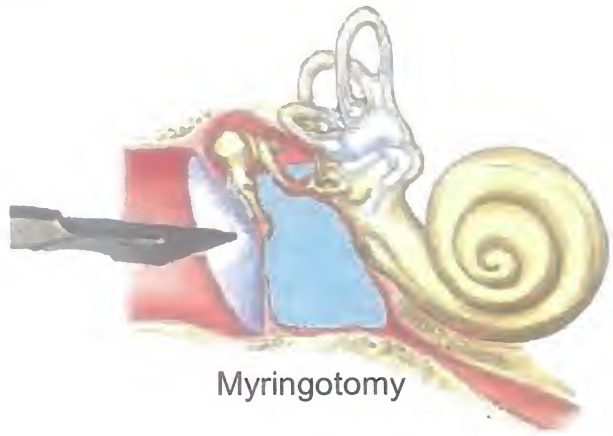
Brainstem implants

Direct stimulation of brainstem when there is no possibility to use cochlear implants as in patient with bilateral profound hearing loss with abnormal cochlear anatomy.
Results are not as good as cochlear implantation but some sound is perceived.

Operations

Myringotomy

Incision of the drum.



Myringotomy

Indications:

1- Acute otitis media (AOM): for drainage
Indicated if there is:
a) Bulging drum.
b) Small or high up perforation.
c) Failure of medical treatment for 48 hours (especially in children)
d) Complications as facial paralysis or mastoiditis.

2- Otitic barotraumas: for drainage.

3- Secretory otitis media (SOM) with insertion of ventilation tube: for ventilation, after failure of medical treatment.

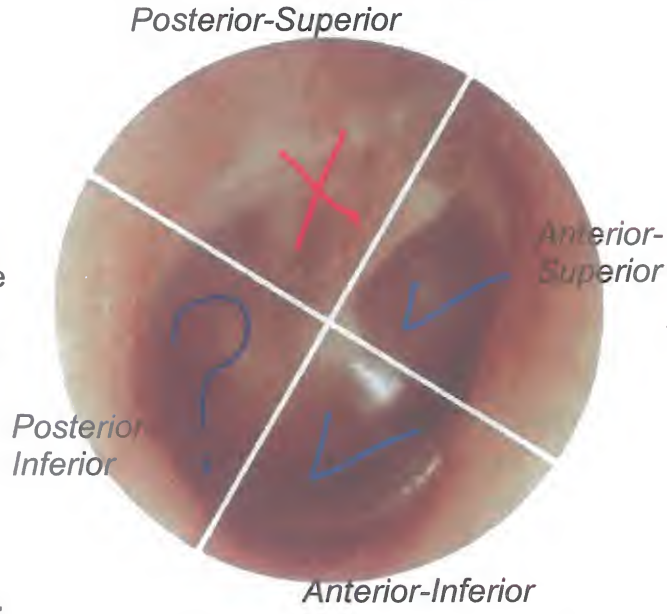
Technique:

- Anaesthesia:

General anaesthesia (GA) in children.
Local anaesthesia (LA) or GA in adults.

- Site of incision:

In the anterior half of the drum; the anterior-superior quadrant is more preferred than the anterior-inferior quadrant for placement of ventilation tube (as there is lack of epithelial migration and then delay in tube extrusion).
Posterior-inferior is another option for drainage in AOM.
It cannot be done in the posterior-superior quadrant as it may lead to injury of incudostapedial joint.



Surgical qudrants of the drum

Advantages of doing myringotomy in AOM:

- To relief pain.
- Surgical incision heals better than pathological perforation.

Complications:

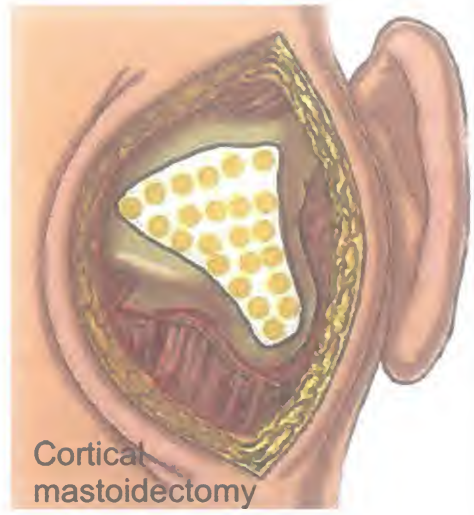
1) Injury to:
   a) Incudostapedial joint.
   b) High Jugular bulb.
2) Persistent perforation.
3) Tympanosclerosis.

AOM and Otitic barotrauma

Secretory otitis media

Cortical Mastoidectomy

Removal of all mastoid air cells.



Indications:

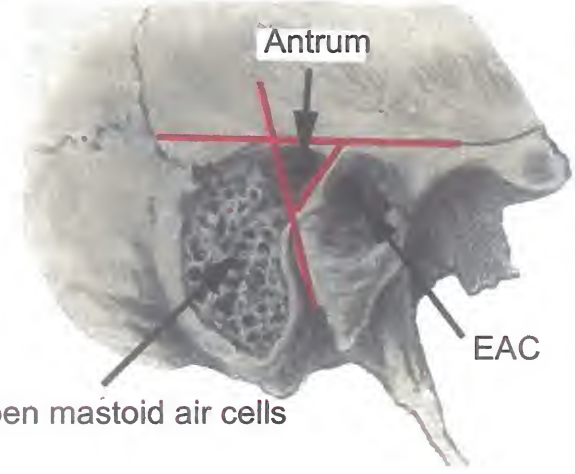
1- Acute mastoiditis: if there is
a) Failed medical treatment for 48hs.
b) Associated with other complications.
c) Mastoid abscess (any type).
2- Part of another operation:
a) Radical mastoidectomy.
b) Tympanoplasty.

Technique:

- Anaesthesia: General.
- Incision: Post-auricular (but take care in children)
- Removal of mastoid cortex, then opening of the antrum (through Mc Ewen`s triangle) and removal of mastoid air cells.

N.B. Mc Ewen's triangle:

It is the surgical landmark for mastoid antrum
Superior: Suprameatal crest
Anterior: Postero-superior meatal wall.
Posterior: Tangential line to posterior meatal wall.

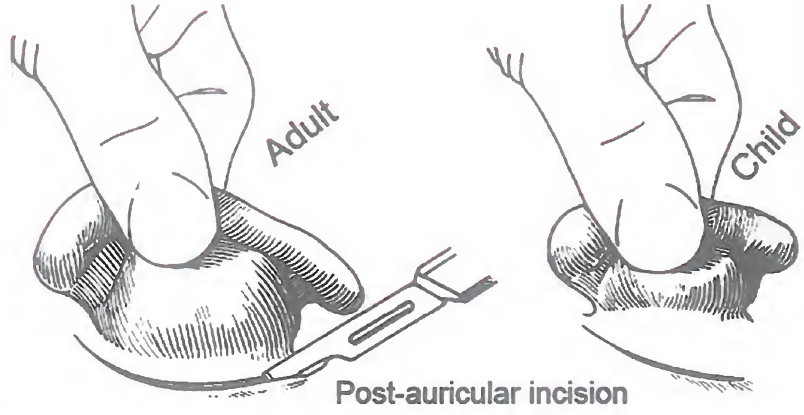


Complications:

1) Injury to:
   a) Dura of middle cranial fossa.
   b) Sigmoid sinus.
   c) Facial nerve.
   d) Lateral semicircular canal.
2) Persistent mastoid fistula.

Radical mastoidectomy

Removal of all mastoid air cells and all middle ear contents except the stapes, converting the mastoid and middle ear into single large cavity.



Indications: 2C + 2T

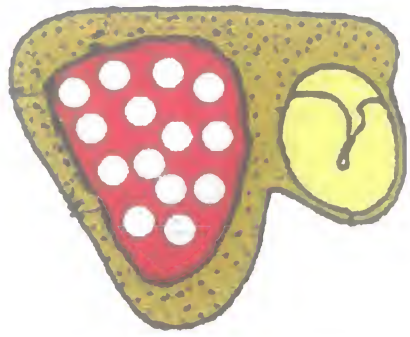
1- **C**holesteatoma if extensive.
2- Cholesteatoma with **C**omplications.
3- **T**umour of middle ear: Carcinoma, or Glomus.
4- **T**.B. otitis media.

Technique:

- Anaesthesia: General.

- Incision: Post-auricular.
- **5 points:**

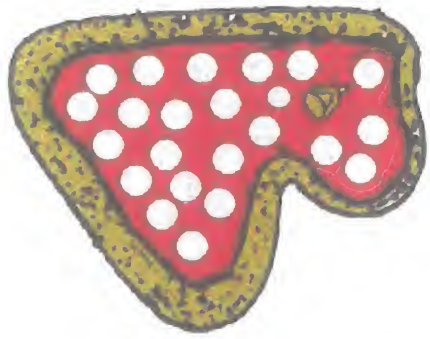
1- Cortical mastoidectomy.
2- Removal of all middle ear contents except the stapes.
3- Removal of the posterior wall of external auditory canal (bony part) by:
. Removal of the bridge (upper part of posterior wall).
. Lowering of the facial ridge (lower part of posterior wall).
4- Obliteration of Eustachian tube.
5- Meatoplasty: Widening of the external auditory meatus (cartilaginous part).



Cortical mastoidectomy

Complications:
As cortical mastoidectomy (1, 2) +.
3- Mastoid cavity problems:
Persistent discharge and wax accumulation.
4- Recurrent cholesteatoma.

***N.B.** Modified Radical mastoidectomy (attico-antrostomy): The same as radical but with removal of unhealthy tissue and preservation of healthy tissues (ossicles or part of drum).*



Radical mastoidectomy

N.B.: ***There are 2 lines of treatment for cholesteatoma:***

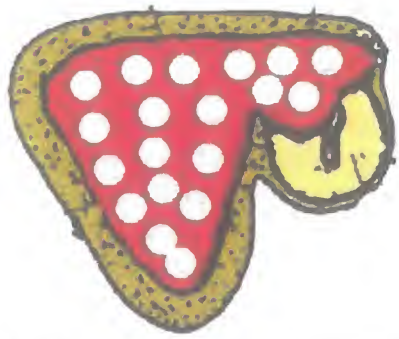
A) Canal wall up (closed) Technique:
It is a combined approach tympanoplasty i.e. we remove cholesteatoma from the middle ear through EAC and from the antrum through cortical mastoidectomy (i.e. combined) and we may open facial recess.

- **Advantages:**

Preservation of posterior meatal wall (of EAC).

- **Disadvantages:**

High incidence of residual or recurrent cholesteatoma, so 2nd look operation is usually needed after 6 months.



Modified radical mastoidectomy

B) Canal wall down (open) Technique:
It is a removal of cholesteatoma through antrum and ME with removal of posterior meatal wall (All or part of it) to facilitate eradication of the disease.

- **Advantages:**

Low incidence of recurrent or residual cholesteatoma.

- **Disadvantages:**

No preservation of posterior meatal wall → difficult reconstruction of hearing.

• Types of the canal wall down (open) technique:
1- Atticotomy: in localized attic cholesteatoma.
2- Modified radical mastoidectomy: in localized attico-antral cholesteatoma.
3- Radical mastoidectomy: in extensive cholesteatoma or if there is complicated CSOM

Tympanoplasty

Eradication of middle ear disease and **Reconstruction** of conductive hearing mechanism.

N.B. *Cortical mastoidectomy should be combined with tympanoplasty if there is ear discharge.*

N.B. *Myringoplasty: it means repair of the tympanic membrane perforation only.*

Indications: 2C + 2T

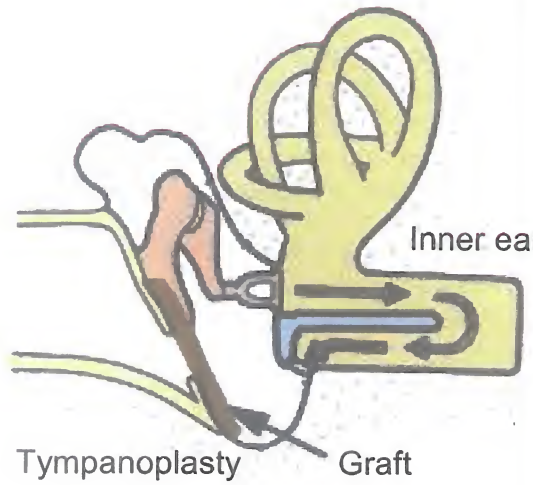
1) **C**SOM (Safe type)
2) **C**ongenital middle ear anomalies.
3) **T**raumatic rupture of drum (myringoplasty).
4) **T**raumatic dislocation of the ossicle (ossiculoplasty).

Technique:

- Anaesthesia: General or Local.
- Incision: Post-auricular.
- Eradication: Removal of polyps and granulation tissues.
- Reconstruction: of

A) Drum by Myringoplasty:
The graft material may be either:
- Temporalis fascia.
- Perichondrium (from tragus).

B) Ossicles by ossiculoplasty:
The graft material may be either:
- Cartilage: from tragus or septum.
- Bone: from mastoid or patient own ossicles.
- Prosthesis: either Total ossicular replacement prosthesis (TORP) or Partial ossicular replacement prosthesis (PORP)



N.B. Approaches (incisions) for middle ear surgery are either:

- Post-auricular: *incision is made above and behind the auricle down to the mastoid tip, about 1 cm from the postauricular groove. The incision should be oblique and high up in children, as the mastoid is still small, this is to avoid injury of facial nerve*

- Permeatal: *through the EAC,an incision is made in the posterior wall of EAC at the level of the isthmus from 12 o'clock superiorly to 6 o'clock inferiorly. The skin flap is elevated downwards with dislodgement of the annulus to enter the middle ear.*

- End-aural: *incision through the cartilage-free gap anterior to the root of the helix then down posterior to the tragus till 12 o'clock to be continued with the permeatal incision.*

Permeatal approach

End-aural approach

Stapedectomy

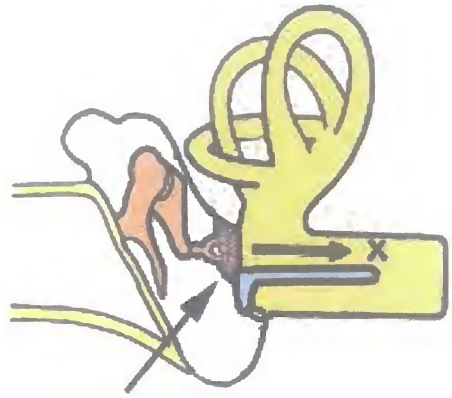
Removal of the stapes superstructure then partial removal or making a hole in the footplate and restoration of conductive hearing mechanism by the use of Teflon piston or fat and wire.

Indications:

Stapedial otosclerosis causing CHL with air-bone gap more than 20 dB.

Technique:

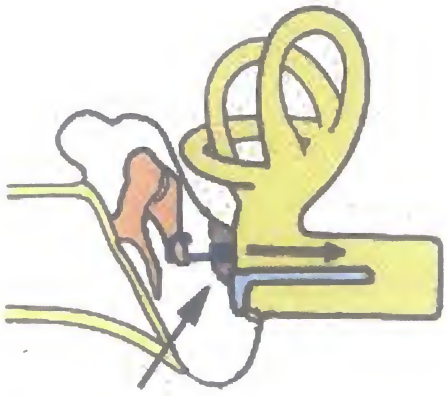
- Anaesthesia: General or Local.
- Incision: Endaural or permeatal.
- After removal of the stapes superstructure, and partial removal or making a hole in the footplate of the stapes, we anchor a Teflon piston on the long process of incus with its distal end in the hole of footplate (oval window).



Otosclerosis

Contraindications: CSOM + pregnancy.

1) **C**hildren: otosclersis is active.
2) **S**NHL
3) **S**chwartz sign +ve.
4) **O**ld age
5) **O**nly hearing ear (hearing aid is preferred)
6) **M**eniere's disease
7) **M**edical contraindications (however local anaesthesia may be used).
8) **Pregnancy**: pregnancy hormones activate otosclerosis.

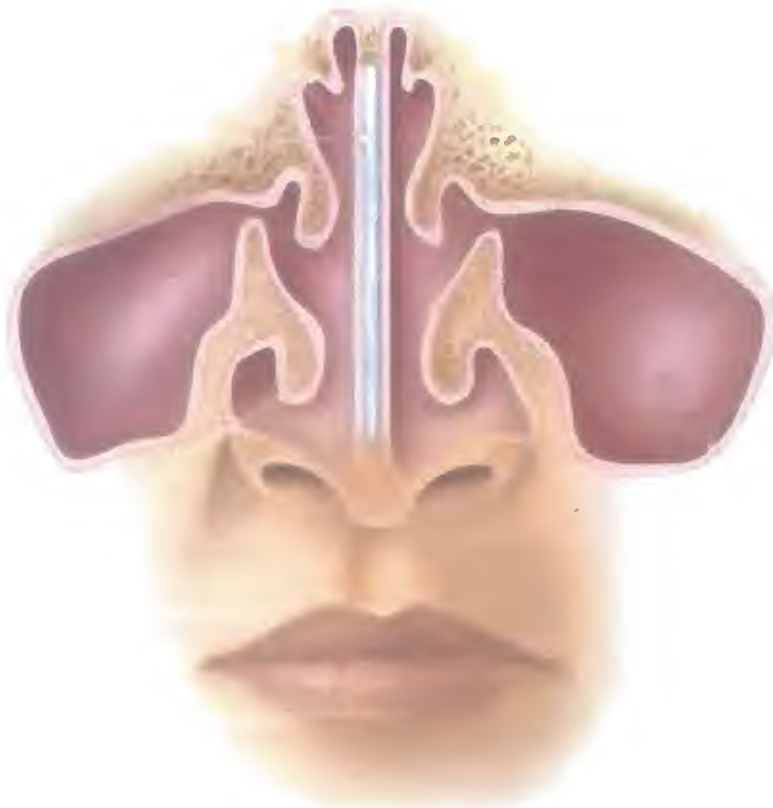


Stapedectomy with teflon piston placement

Complications:

1) SNHL + vertigo due to perilymph fistula.
2) CHL: due to slipping of prosthesis or fracture of long process of incus.
3) Injury to:
- Chorda tympani.
- Dehiscent facial nerve.

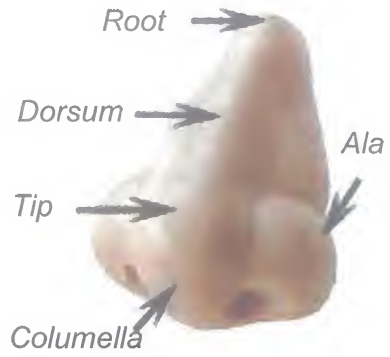
Nose



Anatomy of the nose

External nose:

The nose is pyramidal in shape. Its upper part at the junction between nasal and frontal bones is called root or nasion, its lower most protruding part is called tip, and in between root and tip is the dorsum or nasal bridge. The lower lateral rounded part is called ala, while the medial lower part is called columella.



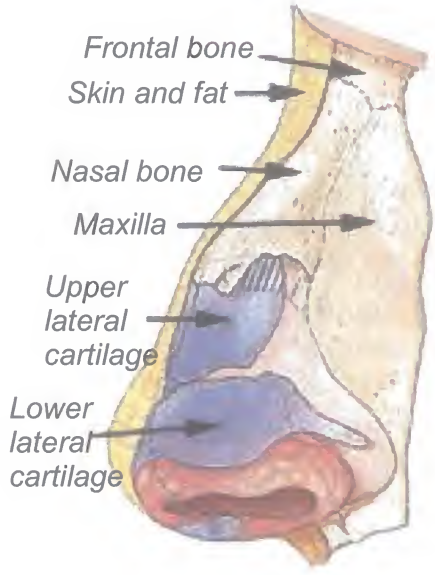
The nasal skeleton:

1- Bony part:

-Two nasal bones.
-Nasal process of frontal bone (above on each side).
-Nasal process of maxillary bone (below on each side).

2- Cartilaginous part:

- Upper and lower lateral cartilages.
- Septal cartilage.



Nasal cavity:

-Tow cavities separated by the septum.
-Each cavity has anterior opening (anterior nares), posterior opening (choana), roof, floor, medial and lateral walls.

Anterior nares: bounded by columella medially and ala laterally.

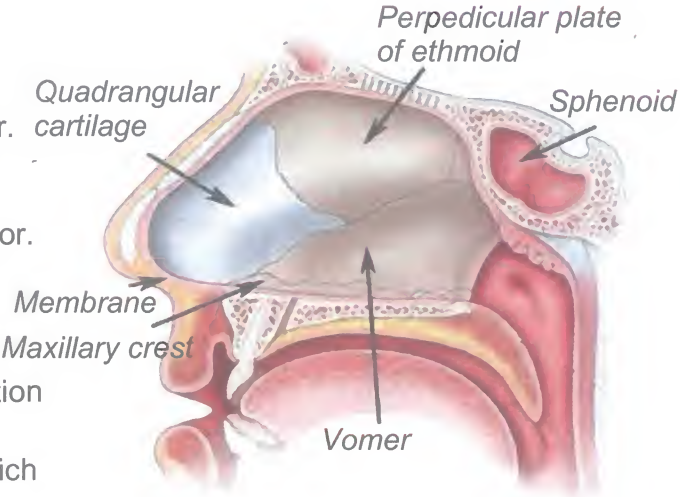
Choana: bounded by the vomer medially and medial pterygoid plate laterally.

Roof: Cribriform plate of ethmoid bone.

Floor: Hard palate

Medial wall:

The nasal septum which is formed of:
- Quadrangular cartilage: antero-inferior.
- Perpendicular plate of ethmoid bone: posterosuperior.
- Vomer (separate bone): postero-inferior.
- Membranous part and maxillary crest: most anterior.



Lateral wall:

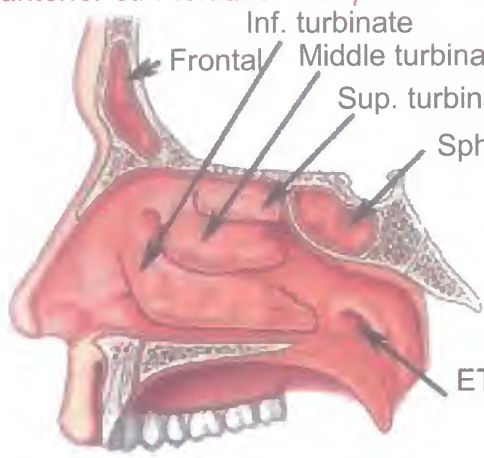
It shows: 3 elevations, 4 spaces (elevation = turbinate, space = meatus):

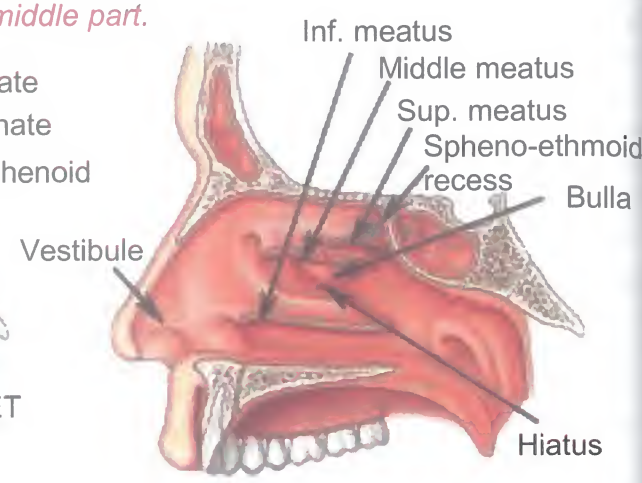
1- Inferior turbinate: the largest one, rich in blood supply and veins.
The inferior meatus below it, in which the nasolacrimal duct open.

2- Middle turbinate: middle in size and site.
The middle meatus opens below it and shows the following features:
A) The bulla ethmoidalis: rounded projection; it is the largest cell of anterior ethmoid.
B) Hiatus semilunaris: semilunar groove below the bulla.
C) Uncinate process: shelf of bone medial to the bulla.

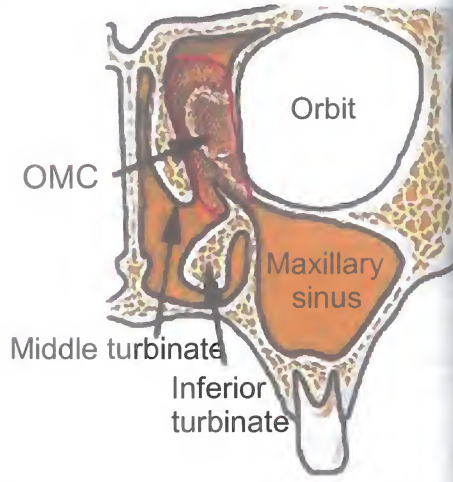
N.B.: *The following sinuses open in the middle meatus:*
-The frontal sinus opens through the frontal recess at the most anterior part.

-The maxillary sinus opens in the posterior part.
-The anterior ethmoidal sinus opens in middle part.





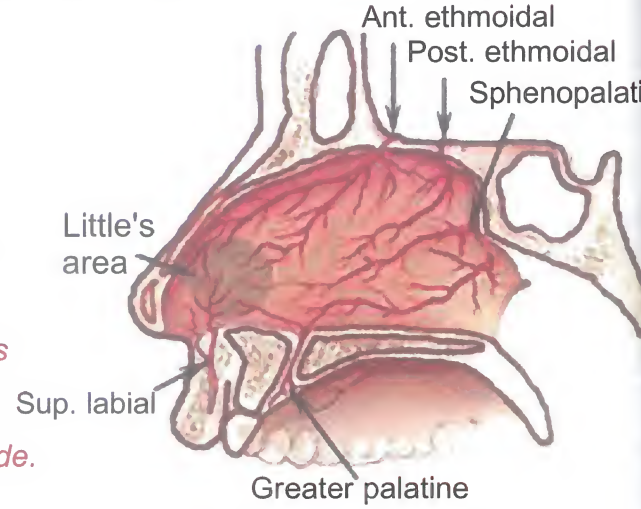
Ostiomeatal complex (OMC): It is the area of drainage of the anterior group of sinuses. Present between lamina papyracea i.e. medial orbital wall: laterally and middle turbinate: medially.



3-Superior turbinate: the smallest, and the superior meatus below it.
The posterior ethmoid opens in the superior meatus.

4-Sphenoethmoidal recess: above the superior turbinate.
The sphenoid sinus opens into it.
N.B.: *Nasal valve: the narrowest part, at the junction of lower and upper lateral cartilages i.e. anterior end of inferior turbinates.*

Blood supply of the nasal cavity:
- Anterior and posterior ethmoidal arteries: superior part
- Sphenopalatine artery: posterior part.
- Superior labial of facial and Greater palatine of maxillary arteries: anterior-inferior part.

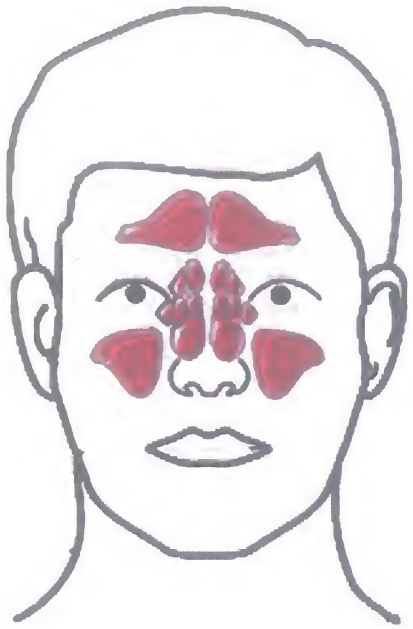


Blood supply of nasal cavity

Venous drainage:
The nasal veins are connected to the cavernous sinus through the ophthalmic veins.
N.B.: *The dangerous area of the face: Infection in which may lead to cavernous sinus thrombosis.*
Boundaries: extends from root of nose superiorly to corner of mouth on each side.

Nerve supply:
- Sensory: Maxillary nerve (of trigeminal nerve).
- Olfactory (Smell): Olfactory nerve (1st cranial).
- Autonomic: Nerve of pterygoid canal (Vidian); formed of
. Sympathetic vasoconstrictor: Deep pertrosal nerve.
. Parasympathetic secretomotor: Greater superficial petrosal nerve (of facial nerve)

Histology:
- Lower part (vestibule): skin contains vibrissae hair.
- Middle part (respiratory part): respiratory mucosa.
- Upper part (olfactory part): olfactory neuroepithelium.



Anatomy of the paranasal sinuses

Four pairs of sinuses arranged in 2 groups:

- Anterior group:

Frontal, Maxillary, and Anterior ethmoid.
All open into the middle meatus (OMC).

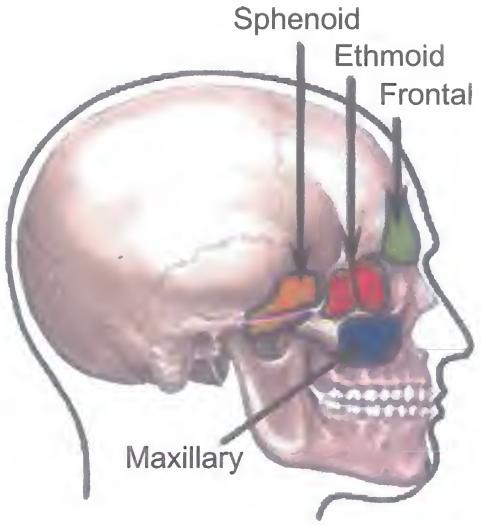
- Posterior group:

Posterior ethmoid and Sphenoid.
Posterior ethmoid opens into superior meatus.
Sphenoid opens into sphenoethmoidal recess.
All the sinuses are lined by respiratory mucosa.

(A) The Maxillary Sinus (Antrum):

- Pyramidal in shape with the apex directed to the zygomatic bone.
- Boundaries:

Roof: Orbit and infra-orbital nerve and vessels.
Floor: Alveolar process (2nd premolar and 1st molar teeth).
Anterior: Cheek
Posterior: Pterygo-palatine fossa.
Medially: Nasal cavity.
- It opens in the posterior part of middle meatus.



(B) The Frontal Sinus:

- It is not present at birth and starts to appear 2-4 years.
- It opens in the anterior part of middle meatus.

(C) The Ethmoid Sinuses:

- Formed of anterior and posterior ethmoid sinuses, separated from each other by bone, which is called the ground lamella.
- Each sinus is formed of multiple air cells.
- The anterior ethmoidal sinus opens in the middle meatus.
- The posterior ethmoidal sinus opens in the superior meatus.

(D) The sphenoid sinus:

- It is located within the body of the sphenoid bone.
- The pituitary gland presents above it in the sella turcica.
- It is related to the internal carotid artery (ICA) and optic nerve.
- It opens into the spheno-ethmoidal recess.

N.B. Aeration (pneumatization) of the middle turbinate is called concha bullosa that may cause obstruction of middle meatus and may become infected.

Lymphatic drainage of nose and sinuses:

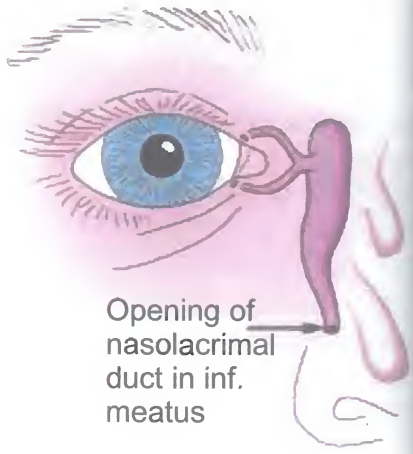
Anterior part of the nose and anterior group of sinuses to submandibular lymph nodes (LNs) while the posterior part of the nose and posterior group of sinuses to retro-pharyngeal LNs then both to the upper deep cervical lymph nodes.

Physiology

Functions of the Nose:
1- Respiratory function.
2- Smell.
3- Resonance of voice.
4- Protective function by:
a- Vibrissae hair filters the large particles.
b- Ciliae of the mucosa filters the small particles.
c- Humidification and warming of inspired air.
d- Reflex sneezing.
e- Lysozyme in nasal secretions.
5- Drainage of lacrimation.

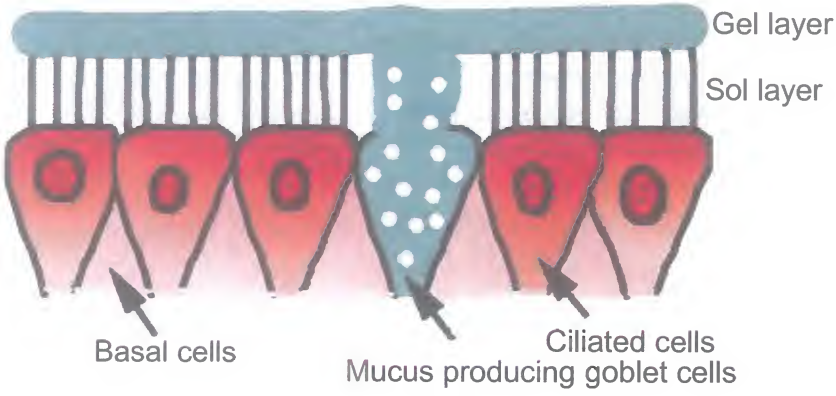
Protective function

Functions of the paranasal sinuses:
1- Lighten the weight of the skull.
2- Humidification and warming of inspired air.
3- Resonance of voice.
4- Thermal insulator.
5- The sinus mucosa provides additional source for mucus secretion to the nasal cavity.



Muco-ciliary clearance (Mucous blanket)

Ciliated mucosa that protect the airway
Structure:
1-Superficial thick (viscid) layer (Gel layer).
2-Deep thin (watery) layer (Sol layer).
The cilia is embedded in the deep thin layer and moved backwards towards the nasopharynx (to wash the gel layer), this movement is biphasic formed of active rapid phase and slow recovery phase,

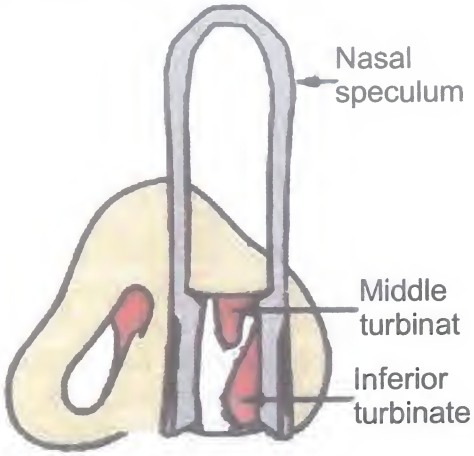


The normal ciliary action is inhibited by:
1- Change in temperature: excessive heat or cold.
2- Smoking.
3- Infection.

Symptoms and methods of nose examination

Before studying nasal diseases, you should know what are the symptoms caused by nose diseases, and how to examine for these diseases (detailed history taking and clinical examination were discussed at the end of this book in clinical ENT)

***Symptoms of nose diseases*:** see clinical ENT
- Nasal obstruction.
- Nasal discharge.
- Epistaxis.
- Facial pain and headache.
- Smell disorder.
- Sneezing.
- Snoring and sleep apnea.
- Swelling or deformity.
- Orbital symptoms.



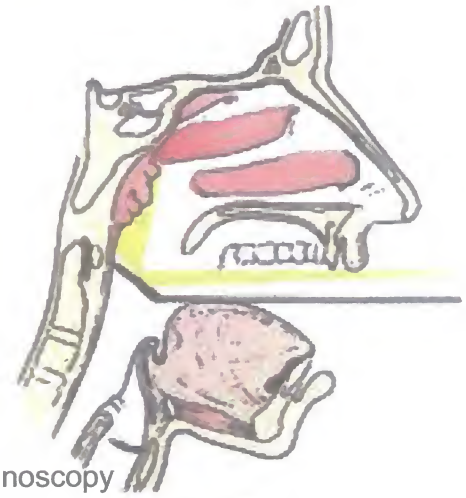
Anterior rhinoscopy

***Methods of nose examination*:** see clinical ENT
-External examination:
Shape: for deformity or swelling.
Airflow: for nasal patency.
Palpation: for tenderness over the nose and sinuses.

-Anterior rhinoscopy: by using nasal speculum, we can see up to the middle turbinate and meatus.

-Posterior rhinoscopy: by using posterior rhinoscopy mirror, we can see the post-nasal space (nasopharynx).

-Nasal endoscopy: by using rigid nasal endoscope, we can see the entire nasal cavity.

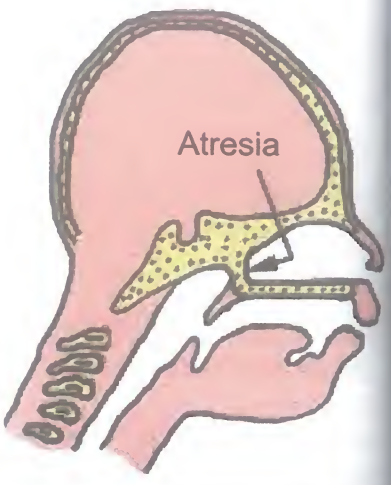

Posterior rhinoscopy


Nasal endoscope


Nasal endoscopy

Congenital diseases

Choanal Atresia



Congenital obstruction of the choana (posterior nasal opening)

Cause: Persistent bucco-nasal membrane.

Types: Bony or membranous, Unilateral or Bilateral

Clinical Picture:

Symptoms:

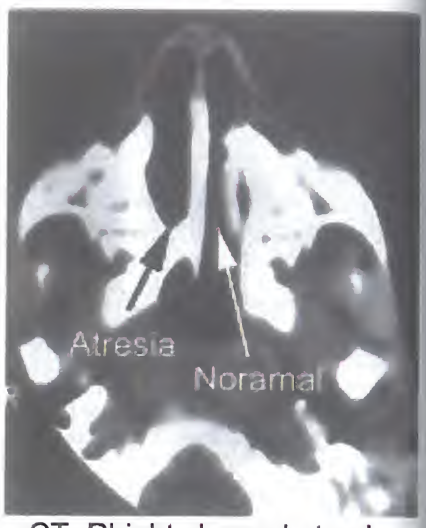
- Unilateral atresia: It may pass unnoticed till the childhood period:
  - a) Unilateral nasal obstruction.
  - b) Unilateral nasal discharge.
- Bilateral atresia: It is an emergency situation at birth as the infant is obligate nose breather in the first 2-3 months:
  - a- Bilateral nasal obstruction.
  - b- Bilateral nasal discharge.
  - c- Difficult suckling.
  - d- Cyanosis which improve on crying.

Signs:

- Rubber catheter cannot be passed from nose to nasopharynx.
- Coloured drops cannot be passed from nose to nasopharynx.

Investigations:

- CT: it differentiates between bony and membranous atresia.
- Nasal endoscopy (infantile size): can show the atresia.



CT: Rhight choanal atresia

Treatment:

Unilateral: The operation is not urgent to be done in the neonatal age, so it is postponed for 2-3 years.

Bilateral: It is an emergency situation:

1- Saving the airway after birth by maintaining the mouth opened; by either:

- Plastic oral airway (oropharyngeal airway)
- Endotracheal intubation

2- When the condition improved, we proceed to the operation.

The operation is either.

- Trans-nasal by endoscope.
- Trans-palatal (may be used in older children).

Endotracheal tube

Oral airway

Traumatic diseases

Fracture nasal bones

Causes: blow or car accident.

Clinical Picture:

Symptoms:

History of trauma.
Pain.
Epistaxis.
Nasal obstruction.
Swelling and deformity.

Signs:

Inspection:

- Swelling: oedema, haematoma, or surgical emphysema (air under the skin).
- Deformity either deviation or depression.

Palpation:

- Tenderness
- Crepitus.

Anterior rhinoscopy:

- Lacerated mucosa (blood clot).
- Dislocation of septum.

Investigations:

X-ray for medicolegal purposes.

Fracture nose before (1) and after (2) reduction

Treatment:

1- Control the epistaxis (if present).
2- ***Reduction*** of fractured bones:
a) If no oedema (early within few hours from trauma): Reduce it immediately under General anaesthesia either manually or by instrument (Walsham's forceps for nasal bones and Asch's forceps for septum).
b) If there is oedema: wait one week till the oedema disappear then reduce the fracture.
c) After 2 weeks (malunion):
Wait for 3 months, and then do rhinoplasty.
3- ***Anterior nasal packing***: to support nasal bones from inside (for 48 hours).
4- ***Fixation*** of bones by plaster of Paris or auliminium sheet: to support nasal bones from outside (for 2 weeks).
5- Antibiotics, analgesics, and anti-inflammatory.

Reduction

Fixation

Walsham's forceps

Asch's forceps

Foreign body (FB) in the nose

Type of the patient: Child or mentally retarded adult.
Type of FB:
- Vegetable as seeds, beans.....
- Non vegetable as beads, paper.....

Clinical Picture:
Symptoms:
Unilateral nasal obstruction.
Unilateral offensive nasal discharge.
Signs:
Anterior rhinoscopy: shows FB or discharge.
Nasal endoscopy (sometimes) is needed.

Complications:
1- Nasal:
Early: infection (rhinitis and sinusitis).
Late: stone formation (rhinolith).
2- Pulmonary:
FB inhalation and respiratory obstruction.

Treatment:
1- If the child is co-operative → Removal by forceps, hook or suction.
2- If the child is not co-operative → Removal under general anaesthesia with cuffed endotracheal intubation to prevent FB inhalation during the procedure.

N.B. FB should be suspected in any child with unilateral nasal obstruction and offensive discharge.

Removal of FB by forceps

Oro-antral fistula

Fistula between oral cavity and maxillary antrum (oro-maxillary).

Causes:
1- Traumatic:
a) Surgical trauma:
-Dental extraction (2nd premolar or 1st molar).
-Radical antrum operation
-Excision of dental or dentigerous cyst.
b) Accidental trauma: penetrating injury.
2- Inflammatory: osteomyelitis of maxilla or syphilitic osteitis.
3- Neoplastic: cancer maxilla eroding the alveolar process.

Clinical picture:
Symptoms:
- Unilateral regurgitation of food and fluid.
- Unilateral offensive nasal discharge (sinusitis).
- Discharge through the fistula to the mouth.

Signs:
- Fistula is seen through oral cavity.
- A probe can be passed from mouth to antrum (not preferred).

CT: Oro-maxillary fistula

Investigations: CT shows the site of fistula + associated sinusitis.

Treatment:

a) Recent cases: (first 24 hours after dental extraction)
- Small fistula: It heals spontaneously
- Large fistula: Surgical closure.

b) Old cases: Surgical closure after refreshening of the fibrosed edge + Radical antrum operation (to clean the sinus).

c) Failed cases: dental obturator.

CSF rhinorrhoea

Leakage of CSF through the nose

Origin:

-Roof of nose: cribriform plate
-Sinuses: ethmoid, frontal or sphenoid sinus.
-Middle ear: CSF otorhinorrhoea through the ET to nose.

Causes:

1- Traumatic:
a) Surgical:
- Endoscopic sinus surgery (ESS)
- Removal of tumour from roof of the nose

b) Accidental: fracture base of anterior cranial fossa.

2- Inflammatory: syphilitic osteitis or osteomyelitis
3- Neoplastic: tumour eroding the roof of nose.
4- Congenital: defect in the cribriform plate.
5- Idiopathic: of unknown cause.

Unilateral watery nasal discharge = CSF rhinorrhoea

Clinical picture:

- Unilateral watery nasal discharge:

Which is clear, colourless, has salty taste, dose not stiffen the handkerchief increased by coughing, straining and leaning forwards.

- Headache: may be due to high CSF pressure (if brain tumour was the cause of leakage) or low CSF pressure (caused by leakage).

Complications: Meningitis

Investigations:

1-Biochemical analysis of discharge:
CSF is characterized by:
- Clear, Colourless and contain no mucus.
- Contain sugar more than 30 mg%.
- Reduce Fehling's solution.
- Contain B_2 transferrin, which is diagnostic.

2-CT with intrathecal metrizamide:
It can detect the site of leakage.

CT with metrizamide: CSF rhinorrhoea

3-Intra-thecal dye (flourescine):
With endoscopic examination of the nasal cavity to see the defect.

Treatment:

A) Conservative: most traumatic cases heal spontaneously
- Bed rest in semi-sitting position with the head-up
- Avoid coughing and straining
- Avoid blowing of nose.
- Avoid nasal medications (drops or packing).
- Prophylactic antibiotics to prevent meningitis.

B) Surgical: covering the defect by graft or flap (muco-periosteal septal flap); if conservation failed. It can be done externally or recently endoscopic.

Inflammatory diseases

Skin of vestibule:
- Furunculosis.
- Vestibulitis.

Mucosa:

Acute rhinitis:
- Specific: Diphtheria
- Non specific: Common cold
  Influenza
  Exanthemata

Chronic rhinitis:
-Specific (granuloma): Scleroma
  Lupus
  Syphilis
  Leprosy
  Fungal infection
-Non-specific: Atrophic rhinitis
  Hypertrophic rhinitis

Furunculosis

Staphylococcal infection of hair follicles (in the vestibule).

Causes: **S**cratch and/or diabetes (**S**ugar)

Clinical picture:

Symptoms:
- Pain and swelling of nose.
- Purulent discharge if the furuncle ruptured.

Signs: Red, hot, tender nodule in the vestibule.

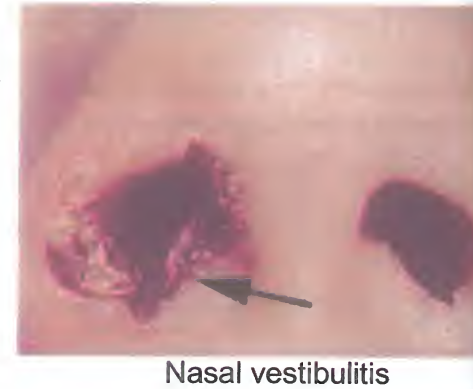
Complications:
- Septal abscess.
- Cavernous sinus thrombosis.

Treatment:

Medical:
-General: Systemic antibiotics + Analgesics.
-Local: Antibiotic cream.

Surgical:
Incision and drainage if abscess is formed.


Furuncle


Nasal vestibulitis

N.B.: *Avoid squeezing of furuncle, to avoid cavernous sinus thrombosis (Dangerous∆).*

Vestibulitis

Diffuse inflammation of the skin of the vestibule.
Causes: 2ry to nasal discharge of common cold.
Clinical picture: diffuse redness and excoriation of the skin of nostril.
Treatment: as the medical treatment of furuncle.

Nasal Diphtheria

- Usually 2ry to faucial (pharyngeal) diphtheria.
- It causes unilateral pseudomembrane which lead to **unilateral** nasal obstruction and serosanguinous discharge (see faucial diphtheria).


Nasal diphtheria

Common Cold (Coryza)

Causative organism: Rhinoviruses (More than 100 types).
Mode of transmission: Droplet infection.
Predisposing factors:
- Over-crowdness.
- Low immunity.
- Exposure to temperature changes.

Incubation period: 1 - 3 days.

Clinical picture:

Symptoms

1- Prodromal stage:

General: - Bony aches.
Local: - Dryness.
- Burning sensation in the nose.
- Sneezing.

2- Catarrhal stage:

General: Fever, headache and malaise.
Local: - Bilateral nasal obstruction.
- Bilateral watery nasal discharge.

3- Stage of 2ry bacterial infection:

The discharge became mucopurulent with persistent nasal obstruction

4- Stage of Recovery:

In about 3 days (without 2ry infection).

Signs

Congested nasal mucosa with watery or mucopurulent discharge.

Complications:

- Infection of surrounding structures:
As sinusitis, otitis media, pharyngitis, laryngitis and bronchitis.
- Anosmia, which may be permanent (viral peripheral neuritis).

Treatment:

A) Prophylaxis:

- Avoid predisposing factors.
- Vaccination is of no value.

B) Curative:

- Complete bed rest and plenty of warm fluids.
- Antibiotics to prevent 2ry infection.
- Analgesic& antipyretic.
- Antihistaminic.
- Vitamin C.

Influenza

Similar to common cold except:
Causative organism:
Influenza virus type A, B and C, or other epidemic viruses.
Clinical Picture: as common cold but more severe.
Complications: as common cold but more common.
Vaccination: can be done.

N.B. Rhinitis of Exanthemata: *similar to influenza but with skin rash, e.g. Measles.*

Chronic hypertrophic rhinitis

Chronic nonspecific rhinitis with hypertrophy of nasal mucosa especially of the turbinates.

Causes:

- Repeated acute rhinitis (common cold).
- Persistence of the predisposing factors
- Allergic rhinitis.
- Prolonged use of decongestant nasal drops (rhinitis medicamentosa)

Hypertrophied inferior turbinates

Clinical picture:

Symptoms

-Bilateral nasal obstruction.

-Bilateral mucoid nasal discharge (anterior and post-nasal discharge).

Signs:

Hypertrophied inferior turbinate, does not shrink with local vasoconstrictor.

Treatment:

1- Treatment of the cause.

2- Medical: Steroid nasal spray.

3- Surgical: Reduction of inferior turbinate by either

- Sub mucous diathermy
- Partial turbinectomy (total turbinectomy may lead to atrophic rhinitis).
- Laser turbinectomy.

Chronic Atrophic Rhinitis

Chronic non-specific rhinitis with atrophy of nasal mucosa (and its contents) and its bony turbinates.

Causes:

a) 1ry: bilateral and more in female, of unknown cause but may be due to: (DAHAB)

Deficiency of iron and vitamin A.
Autoimmune disease.
Hormonal (oestrogen deficiency).
Autonomic imbalance (sympathetic over activity).
Bacillus (Klebsiella) ozaenae infection.

b) 2ry: destruction of nasal mucosa by either:

Granuloma
Operations as turbinectomy (if done total)
Irradiation
Deviated septum (in wider side).

Atrophic turbinates

Clinical picture:

Symptoms:

- Nasal obstruction (in spite of roomy nose):

Due to loss of sensation of air passage (atrophy of nerve endings).

- Nasal discharge: crusty, greenish black and offensive (not perceived by patient).
- Anosmia (atrophy of olfactory mucosa).
- Epistaxis on removal of crusts.

Signs:

- Atrophic dry nasal mucosa.
- Atrophic turbinates.

- Roomy nasal cavity.
- Crustations, which is greenish black, offensive with bleeding on removal.

Treatment:

1- Treatment of the cause.

2- Medical:

a) Alkaline nasal douche → dissolve crusts.
b) Menthol paraffin oil (nasal drops) → ↓ offensive odour (foetor).
c) 25% Glucose in glycerin (nasal pack) → ↓ proteolytic organisms.
d) Potassium iodide (systemic) → stimulates mucus glands secretion.
e) Oestrogen (Local) → stimulates mucus glands secretion.
f) Mucolytics.
g) Iron and vitamin A.
h) Antibiotic.

3- Surgical:

Aim → narrowing of nasal cavity till the mucosa regenerate.
a) Submucosal augmentation by bone or cartilage.
b) Young's operation: closure of one side of the nose for one year then open it and operate on the other.

Granuloma of nose

Granuloma is a chronic specific inflammation with formation of macrophages.

Types:
1. *Rhinoscleroma: the commonest.*
2. *Syphilis.*
3. *Lupus.*
4. *Leprosy.*
5. *Fungal infection.*

Rhinoscleroma

- The commonest granuloma in Egypt.
- Caused by klebsiella rhinoscleromatis (G-ve intracellular diplobacilli).
- More common in females (usually starts at 15 - 25 years).
- Endemic in certain areas as Sharkia governrate in Egypt.

Pathology:

a. *Atrophic stage:* as atrophic rhinitis
Atrophy of mucous membrane, blood vessels, nerves, glands and bony turbinates.

b. *Active nodular (hypertrophic) stage:*
Characterized by formation of inflammatory cells:
* Russell bodies: degenerated bright red plasma cells.
* Mikulicz cells: large vacuolated foamy cells (macrophages engulfing the organisms).
It is the diagnostic stage.


Bilateral nasal masses

c. *Fibrotic stage:* fibrous tissue formation (collagen bundle and fibroblasts).

Clinical Picture:

1. **Atrophic stage:** similar to atrophic rhinitis (Symptoms + Signs).
2. **Active nodular stage:**

Symptoms:
Bilateral nasal obstruction and bilateral nasal discharge (crusty).

Signs:
Bilateral nasal masses mainly at the **muco-cutaneous** junction of nasal cavity.

3. **Fibrotic stage:**
- Bilateral nasal obstruction (internal fibrosis).
- Deformity (external fibrosis).

Investigations:
1. Biopsy: Mikulicz cells and Russell bodies in active stage.
2. Culture (not essentially needed): after mincing of the tissues.

Complications:
1. Extension:
- Subcutaneous → ulceration + fibrosis.
- Lacrimal sac → dacryo scleroma.
- Pharynx → pharyngoscleroma.
- Larynx → laryngoscleroma (subglottic area).

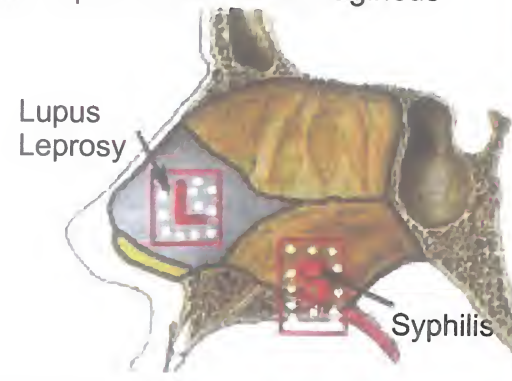
2. Fibrosis.
3. Malignant transformation: if treated by radiotherapy.


Hypertrophic stage

Treatment:
A. Medical:
1. Rifampicin: 600 mg/day.
Side effects: hepatotoxic + red discolouration of urine.
2. Streptomycin: 1gm I.M./day for 40 days (not used nowadays).
Side effects: ototoxic + nephrotoxic.
3. Alkaline nasal douche to dissolve the crusts.
B. Surgical: Removal of the masses (better by laser).
N.B. Radiotherapy is not longer used nowadays for treatment of rhinoscleroma as it is carcinogenic and the condition is benign.

Lupus
- Caused by attenuated T.B. bacilli.
Site: anterior part of nasal septum (cartilaginous part) at muco-cutaneus junction.
- Causing **apple-jelly nodule**, which ulcerates lead to perforation of cartilaginous septum.

Treatment:
A. Medical: anti-tuberculous as Rifampicin and alkaline nasal douche to dissolve crusts.
B. Surgical: correction of deformity.



Syphilis
- Caused by treponema pallidum.
- Types: congenital or acquired

Gumma
It occurs in tertiary syphilis
Site: Posterior bony septum (it is a disease of blood vessels).
Causing perforation in posterior bony part; and leads to saddle nose.
It may cause perforation of hard palate.

Treatment:
A. Medical: Anti-syphilitic as penicillin and alkaline nasal douche.
B. Surgical: correction of deformity.

Leprosy
- Caused by mycobacterium leprae.
Site: anterior part of nasal septum (cartilaginous), causing its perforation.
Clinical picture and treatment: as lupus.

Fungal infection (Fungal rhinosinusitis)

Types:

1. Non-invasive type:

Fungus ball (mycetoma)

- It occurs in immunocompetent patients.
- Cause: Aspergillus
- Symptoms: persistent post-nasal discharge.
- Signs: nasal endoscopy shows no specific changes.
- Investigations: CT shows fungus ball in the sinus with heterogenous opacity (calcification)
- Treatment: surgery (endoscopic sinus surgery [ESS] for removal of fungus ball).

CT: Calcification of fungal infection

Allergic fungal sinusitis

- It occurs in immunocompetent atopic patients.
- Cause: dematiaceous species (Bipolaris) or Aspergillus.
- Symptoms:

Bilateral or unilateral nasal obstruction with manifestations of atopy.

- Signs:

Nasal endoscopy shows bilateral or unilateral polyps and greenish mud (mucin)

- Investigations: CT shows heterogenous opacity (calcification) with bone expansion.
- Treatment: combination of surgery (ESS for removal of polyps) and anti-allergic (steroids), the use of anti-fungal is controversial.

2. Invasive type:

Chronic (Indolent) type

- It occurs in immunocompetent patients.
- Cause: Aspergillus
- Subtypes: granulomatous and non- granulomatous, it invades the orbit and skull base.
- Symptoms: nasal obstruction, headache, proptosis, and cranial nerve paralysis.
- Signs: nasal endoscopy shows polypoid mucosa and sometimes granuloma.
- Investigations: CT shows calcification with invasion to orbit and/or skull base.
  Biopsy with histopathological examination and culture is helpful.
- Treatment: combination of surgery (ESS for removal of masses) and anti-fungal drugs,
- *Prognosis: recurrence is common, so long-term follow up is needed.*

Acute (Fulminant) type (Mucormycosis)

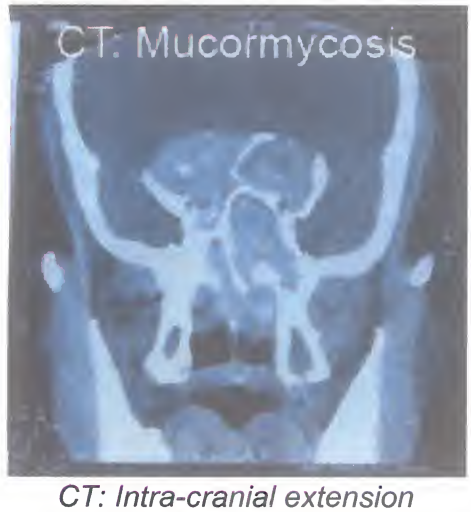
- It occurs in immunocompromised patients (diabetes, AIDS).
- Cause: Mucoraceae, it invades the arterioles causing thrombosis and necrosis.
- Symptoms:

Nasal obstruction, headache, orbital manifestations (proptosis, ophthalmoplegia and diminution of vision) and cerebral manifestations (cranial nerve paralysis).

- Signs:

Nasal endoscopy shows black necrotic tissues with ulcerations and crusts.

- Investigations: CT shows extensive bone destruction with orbital and/or cerebral invasion.



CT: Intra-cranial extension

- Treatment: combination of surgery (ESS for debridement of necrotic tissues) and anti-fungal drugs (Amphotercin), with control of diabetes.
- *Prognosis: high mortality, so aggressive treatment is needed.*

Diseases of the nasal septum

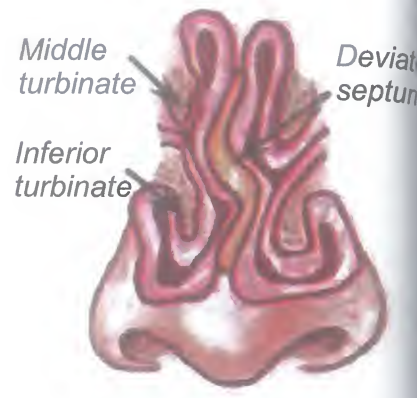
Deviated Septum

The septum is rarely in mid-line; it may be deviated to right or to left or to both sides.

Causes: either

1- Developmental.

2- Traumatic.



Pathology:

1- Simple deviation:

C-shaped (obstruction of one side)

S-Shaped (obstruction of both sides).

2- Deviation with spur:

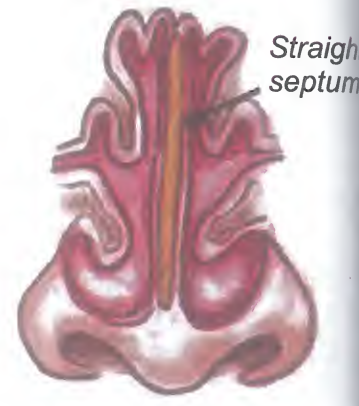
Sharp angulations at bony-cartilaginous junction.

3- Deviation with dislocation:

Displacement of septum from columella.

Clinical picture:

Symptoms:



1- Asymptomatic: in mild cases.

2- Nasal obstruction:

- Unilateral in C-shaped deviation.
- Bilateral in S-shaped deviation.

3- Nasal discharge: (ant. and post-nasal); due to contact of medial wall (septum) and lateral wall or sinusitis.

4- Epistaxis: due to angulations of blood vessels.

5- Headache: due to

- Sinusitis.
- Contact between medial (septum) and lateral (turbinate) walls.
- Vacuum headache caused by obstruction of frontal recess (opening of frontal sinus).

Signs:

1- Anterior rhinoscopy shows the deviation.

2- Nasal endoscopy may be needed to see posterior deviation.

Complications:

1- Recurrent sinusitis (obstruction of sinus opening).

2- Recurrent otits media (obstruction of Eustachian tube).

3- Recurrent pharyngitis (Mouth breathing).

4- 2ry atrophic rhinitis or compensatory hypertrophy of turbinates in wider side.

Investigations:

CT to show the associated sinusitis.

Treatment: Surgical correction by **either**

a) Sub mucous resection (SMR): after the age of 18 years.

Or b) Septoplasty: at any age.

Dislocation

Deviated sptum

After SMR

Septal haematoma

Collection of blood between mucoperichondrium and cartilage of septum.

Causes: Usually traumatic
- Surgical: after SMR or Septoplasty.
- Accidental: associated with fracture nose.

Clinical picture:

Symptoms:
- History of trauma.
- Bilateral nasal obstruction.

Signs:
- Anterior rhinoscopy → bilateral fluctuant swelling on both sides of septum.
- Syringe aspiration → blood.

Septal haematoma

Complications:

Secondary infection leads to septal abscess with its complications.

Treatment:

1- Systemic antibiotics to prevent 2ry infection.
2- Incision and evacuation: vertical incision on one side and horizontal on the other, to avoid septal perforation.
3- Anterior nasal pack to prevent recollection.

Septal abscess

Collection of pus between mucoperichondrium and cartilage of the septum.

Causes:
- Infected haematoma.
- Infected surgical wound.
- Furuncle.

Clinical Picture:

Symptoms:

General:

Fever, headache and malaise.

Local:
- Pain become throbbing on abscess formation.
- Bilateral nasal obstruction.
- Purulent nasal discharge after rupture of the abscess.

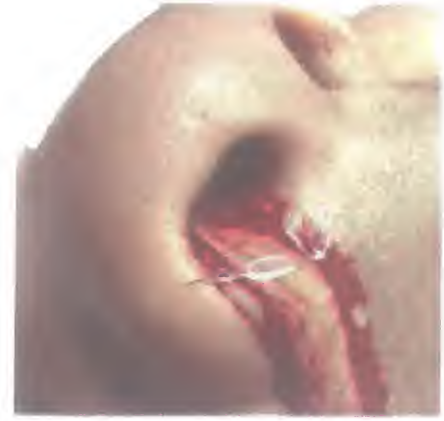
Septal abscess

Signs:
- Anterior rhinoscopy → Bilateral fluctuant tender swelling on both sides of the septum.
- Syringe aspiration → pus.

Complications:
- Cavernous sinus thrombosis.
- Necrosis of septal cartilage → perforation of septum and supratip depression of nasal dorsum.

Treatment:

1- Systemic antibiotics.
2- Incision and evacuation (as septal haematoma).
3- Anterior nasal pack to prevent recollection.



Drainage of abscess

Septal Perforation

Causes:

1- Traumatic:

- Surgical:

SMR and Septoplasty (more in SMR).
Cauterization if done bilaterally in the same time.

- Accidental:

Nose picking → localised perichondritis.
Penetrating injury.

2- Inflammatory:

- Acute → Septal abscess.
- Chronic Lupus → (cartilaginous).
  Leprosy → (cartilaginous).
  Syphilis → (bony).

3- Neoplastic: Malignant tumour.

4- Toxic:

Cocaine addiction → ischemia (severe vasoconstriction) leads to cartilage necrosis.

Septal perforation

Clinical picture:

- It may be asymptomatic (if small).
- Epistaxis and crusty discharge.
- Whistling sound during respiration.

Button-like obturator

Treatment:

- Medical:

Repeated alkaline nasal douche to dissolve the crusts.
Closure of the perforation by an obturator (button like).

- Surgical:

Closure of the perforation by graft or mucosal flap from the surrounding area (with no good results due to the associated fibrosis).

Rhinosinusitis (Sinusitis)

Inflammation of the mucosa of the sinuses (sinusitis), it is usually associated with rhinitis, so it is called **rhinosinusitis** (one or more of the sinuses may be affected).

Types:

Acute rhinosinusitis

Acute onset of bacterial rhinosinusitis with duration less than 4 weeks, it is usually preceded by upper respiratory viral infection (common cold or influenza).

Recurrent acute rhinosinusitis

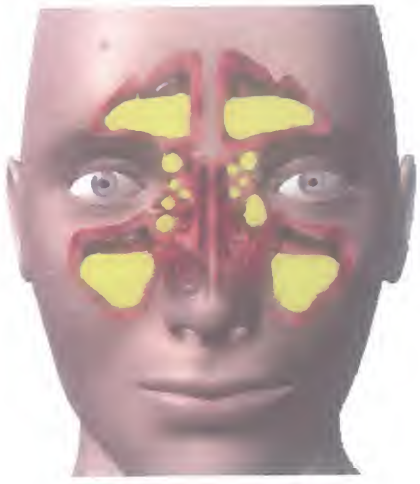
Recurrence of acute attacks 4 or more times/year.

Sbacute rhinosinusitis

Rhinosinusitis of more than 4 weeks and less than 12 weeks.

Chronic rhinosinusitis

Rhinosinusitis of more than 12 weeks. Acute exacerbations (acute worsening) is common.



Sinusitis

Causative organism:

Acute rhinosinusitis: Strept. Pneumoniae.
Hemophilus influenzae.
Moraxella catarrhalis.

Chronic rhinosinusitis: Gram +ve as Staphylococcus aureus
Gram –ve bacteria
Anaerobes
Fungi

N.B.: Sinusitis of dental origin → anaerobic infection leads to offensive discharge

Predisposing factors:

Upper respiratory viral infections: lead to congestion and edema of mucosa of nose and sinuses resulting in obstruction of sinus ostium (meatus) and blockage of drainage.

Recurrent acute and chronic rhinosinusitis may be predisposed by persistent factor as:

General: low resistance and overcrowdings.

Local: deviated septum and allergic rhinitis (obstruction of sinus ostium).

Routes of infection:

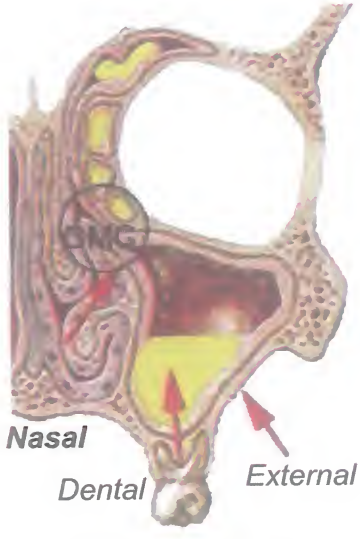
a) Nasal:

- Extension of infection: rhinitis then secondary infection
- Passage of infected material:

FB in nose.
Nasal pack
Nasogastric tube
Infected water.

b) Dental: dental caries or oro-antral fistula.
Lead to maxillary sinusitis.

c) External: Fracture maxilla reaching to the sinuses (rare).



Routes of infection

Pathology:

Obstruction of the ostio-meatal complex (OMC): due to oedema of rhinitis, deviated septum and/or allergy (or polyp) resulting in blockage of drainage and stagnation of secretions with destruction of cilia. Stagnant secretion is a good media for bacterial growth.

Clinical picture:

Symptoms:

History of common cold is common, it precedes the acute attack.

General:

Fever, headache and malaise in acute sinusitis and acute exacerbations.

Local:

- Nasal obstruction (unilateral or bilateral)
- Nasal discharge (unilateral or bilateral, mucopurulent):

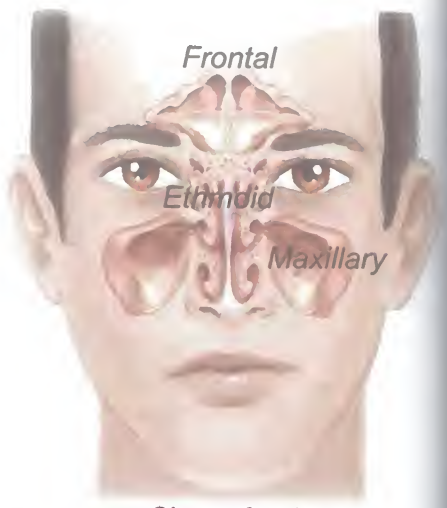
The discharge is anterior and posterior nasal.

- Facial pain and headache:

a- Its site is over the affected sinus.

b- Increases by coughing, straining and leaning forwards.

c- More severe in the morning.



Sites of pain

Signs:

General: High temperature and rapid pulse.

Local:

- Inspection: oedema (occurs only with complications).
- Palpation: Tenderness over the affected sinus.
- Anterior rhinoscopy and nasal endoscopy:

a) Congestion and oedema of nasal mucosa.

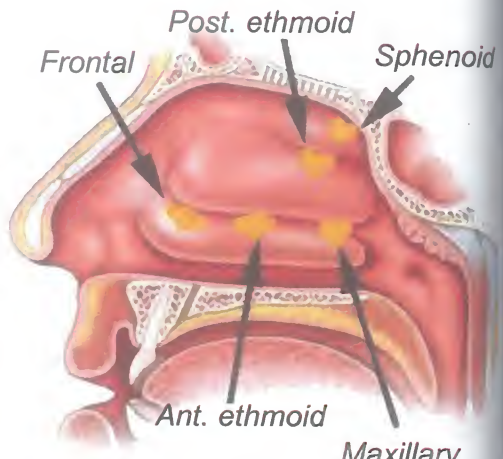
b) Mucopurulent discharge in:

Middle meatus = sinusitis of anterior group.

Superior meatus = sinusitis of posterior ethmoid.

Sphenoethmoidal recess = sphenoidal sinusitis.

- Posterior rhinoscopy: post-nasal discharge.



Sites of discharge

***N.B.:** in addition to the general picture, each sinus has specific manifestations as following:*

Maxillary sinusitis:

Symptoms:

- History of dental problems may be present.
- The nasal discharge is offensive (dental cause)
- Facial pain: over the cheek referred to the teeth and ear.

Signs:

- Palpation: tenderness over the cheek (if acute).
- Anterior rhinoscopy and nasal endoscopy:

Discharge in posterior part of middle meatus.

- Oral examination may show dental problem.

Frontal sinusitis:

Symptoms:

- Facial pain: over the forehead (called vacuum or periodic headache, due to –ve pressure in the sinus).

N.B. the pain has characteristic periodicity; it starts in the morning, increases in mid-day, and then gradually decreases by the end of the day.

Signs:

- Palpation: tenderness over the forehead and floor of sinus (if acute).
- Ant. rhinoscopy and nasal endoscopy: discharge in anterior part of middle meatus.

Acute ethmoidal sinusitis (Ethmoiditis):

Symptoms:

- Facial pain: Over the inner canthus in anterior ethmoidal sinusitis.
  Retro-orbital in posterior ethmoidal sinusitis.

Signs:

- Palpation: Tenderness over the inner canthus (if acute).
- Anterior rhinoscopy and nasal endoscopy:

Discharge in middle meatus: anterior ethmoidal sinusitis.
Discharge in superior meatus: posterior ethmoidal sinusitis.

N.B. Complications are common in ethmoiditis of children due to:

1- Thin lamina papyracea.
2- Low immunity.

N.B.: Infection usually starts in the ethmoid, then spread to other sinuses.

N.B.: Nasal polypi may be seen in chronic ethmoid sinusitis.

Acute sphenoidal sinusitis (sphenoiditis):

Symptoms:

- Facial pain: retro-orbital referred to the occipital region.

Signs:

- Nasal endoscopy: discharge in sphenoethmoidal recess.

Investigations:

- X-ray (sinus view): It shows opacity or fluid level.
- Culture and sensitivity of discharge.
- CT (in chronic and recurrent acute cases):

It shows opacity of the infected sinus and conditions of the ostiomeatal complex (OMC). It is mandatory as a pre-operative investigation to detect any anatomical abnormality such as low cribriform plate, dehiscent carotid or optic nerve.

CT: Normal sinuses

Treatment:

a) Medical:

- Complete bed rest with plenty of warm fluids in acute cases.
- Systemic antibiotics according to culture and sensitivity.
- Analgesic, antipyretics for pain and headache.
- Decongestant nasal drops as Xylometazoline (avoid prolonged use as it leads to rhinitis medicamentosa).
- Steam inhalation.
- Warm fomentations over the affected sinus.
- Treatment of predisposing factor (if present)

b) Surgical:

Indications: Failure of medical treatment.
Complicated sinusitis.

CT: Bilateral maxillary sinusitis

Nowadays FESS (Functional Endoscopic Sinus Surgery) is the standard surgical treatment for chronic and recurrent sinusitis; in which the diseased mucosa is removed while the healthy mucosa is preserved with restoration of sinus drainage.

Old surgical procedures:

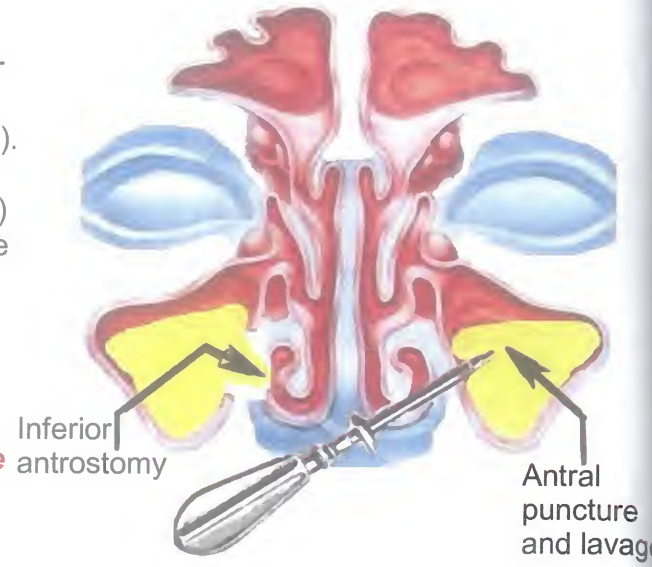
Maxillary sinusitis: Antral puncture and lavage, intra-nasal inferior antrostomy, or Cald-well Luc operation to remove the sinus mucosa (see chapter of operations).

Frontal sinusitis: Trephine operation (opening the floor and placement of tube) or osteoplastic flap operation in which the sinus is obliterated by fat.

Ethmoidal sinusitis: External ethmoidectomy.

Sphenoidal sinusitis: External spheno-ethmoidectomy.

All these procedures became obsolete and were replaced by FESS.



Rhinosinusitis in Children

It is usually maxillary or ethmoid sinusitis as other sinuses start to develop later (4th year).

Predisposing factors:

General:

1- Respiratory tract viral infection as common cold and exanthemata.
2- Allergic rhinitis either perennial or seasonal.
2- Mucociliary defects as in cystic fibrosis (viscid mucus) and Kartagner's syndrome (immotile cilia).
3- Low immunity of children.

Local:

Adenoid: causes nasal obstruction and stagnation of mucus.

Causative organism: Hemophilus influenza, Strept., Pneumoniae and/or Moraxilla catarrhalis.

Complicated sinusitis in children

Clinical picture:

Acute sinusitis:

- Fever is more severe in children.
- Nasal obstruction and mucopurulent discharge.
- Oedema at the root of the nose and between eyes may be present (soft bone).

Chronic sinusitis:

- Persistent nasal obstruction and mucopurulent discharge.
- Symptoms of descending infection: as recurrent pharyingitis, cough and otitis media.

N.B. Complications are more common especially the orbital as the lamina papyracea is thin in children.

Treatment:

Medical:

- Systemic antibiotics and analgesic antipyretics.
- Decongestant nasal drops and saline irrigation.
- Anti-allergic treatment.

Surgical: Adenoidectomy

FESS is rarely needed as in complicated cases and after failure of medical treatment.

Complications of sinusitis (rhinosinusitis)

Extension of infection beyond the muco-periosteal limit of the sinuses.

Causes:

1- Acute sinusitis especially in children.
2- Acute exacerbation on top of chronic sinusitis.

Types:

A) Orbital complications: is the commonest

1- Orbital oedema.
2- Orbital cellulitis.
3- Extra-periosteal abscess.
4- Sub-periosteal abscess.
5- Cavernous sinus thrombosis.

N.B.: Posterior group of sinuses may lead to:

1- Optic neuritis.
2- Superior orbital fissure syndrome.
3- Orbital apex syndrome.

B) Cranial complications:

1- Osteomyelitis (frontal, rarely maxillary).
2-Fistula (after rupture of sub-periosteal abscess).

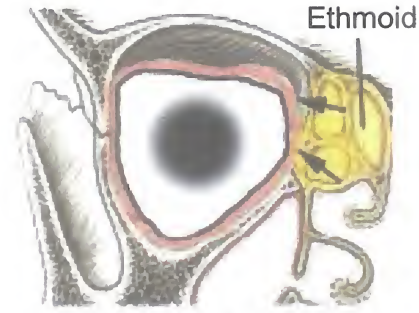
C) Intracranial complications:

1- Extradural abscess.
2- Subdural abscess.
3- Meningitis.
4- Brain abscess (frontal lobe).
5- Cavernous sinus thrombosis.

D) Others:

1- Descending infections: Recurrent otitis media, pharyngitis, laryngitis and bronchitis.
2- Mucocele: if the sinus ostium is obstructed.

Orbital complication



Orbital cellulitis

Extra-periosteal abscess

Orbital abscess

Orbital Complications

The ethmoid sinus is the commonest source for orbital complications as it is separated from the orbit by thin plate of bone called lamina papyracea which is sometimes dehiscent.

Clinical picture: 5 stages

1- Orbital oedema: due to venous obstruction.
Oedema of upper eyelid.

2- Orbital cellulitis: No pus formation.
Oedema of upper eyelid.
Pain in the eye.
Chemosis.
Proptosis.
Ophthalmoplegia.
Reversible diminution of vision.

3- Extra-periosteal abscess: Collection of pus outside the orbital periosteum.
As above but pain become throbbing.

4- Orbital abscess: Collection of pus within the orbit due to rupture of orbital periosteum.
As above but the diminution of vision is irreversible.

5- Cavernous sinus thrombosis: Extension of thrombosis through the ophthalmic veins.

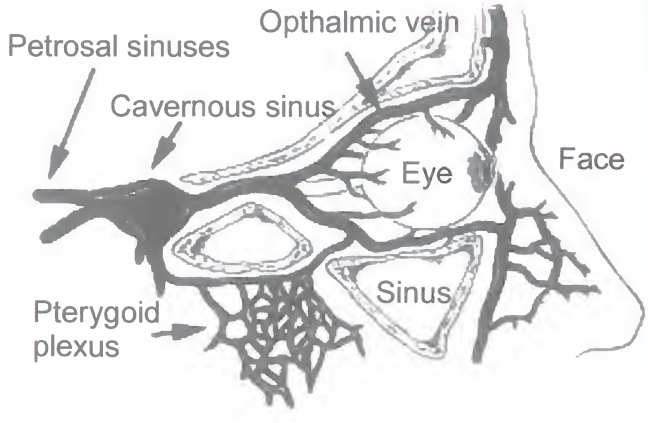
Investigations:
- CT for nose and paranasal sinuses
- Ophthalmologic consultation for assessment of vision and fundus examination

Treatment:
Medical:
-Hospitalization.
-Systemic antibiotics.
-Steroids: given if there is diminution of vision.
Surgical:
Decompression and drainage of pus through endoscopic sinus surgery (ESS)
- Indications: Failed medical treatment for 48 hours.
Abscess formation.
Diminution of vision.

N.B.: Complications of posterior group of sinuses may lead to:
1- Orbital apex syndrome:
Compression of structures passing through superior orbital fissure and optic foramen.
Ophthalmic vein → oedema of upper eyelid.
Ophthalmic nerve of 5^{th} → pain over forehead.
3^{rd} ,4^{th} ,6^{th} cranial nerves → ophthalmoplegia + proptosis.
Optic nerve → diminution of vision.
2- Superior orbital fissure syndrome:
Compression of structures passing through the superior orbital fissure only (ophthalmic vein and nerve, 3^{rd},4^{th}, 6^{th} cranial nerves).
3- Optic neuritis.

Osteomyelitis of frontal bone
Symptoms:
- Pain and swelling of forehead.
- Discharging fistula after rupture of subperiosteal abscess.
Signs:
Tender fluctuant swelling of the forehead (sub-periosteal abscess = Pott's puffy tumour).
Investigations: CT is diagnostic.
Treatment:
Medical: Hospitalization and systemic antibiotics.
Surgical: Drainage of abscess and treatment of sinusitis.

Cavernous sinus thrombosis
Causes:
Spread of infection from SOS
1-**S**kin sepsis in the dangerous triangle.
2-**S**inusitis.
3-**O**rbital infection.
4-**S**uppurations of the pharynx: through emissary vein to cavernous sinus
5-Lateral **S**inus thrombophlebitis complicating CSOM: through petrosal sinuses.



Clinical picture:
General: Fever, headache and malaise.

Local: Oedema of upper eyelid.
Chemosis.
Proptosis.
Ophthalmoplegia.
Diminution of vision → blindness.


Cavernous sinus thrombosis

Investigations:
- CT with contrast.
- MRV (magnetic resonance venography).

Treatment:
Medical:
- Hospitalization.
- Systemic antibiotics (intravenous) that cross the blood brain barrier.
- Anticoagulants as heparin.

Surgical:
Treatment of infected sinuses after recovery.

Mucocele

Cystic expansion of the sinus with mucus, when infected it is called pyocele.

Causes:
Obstruction of the sinus ostium due to:
- Traumatic: surgical (after nasal surgery) or accidental.
- Neoplastic: osteoma.
- Inflammatory: fibrosis of the ostium.

Sites:
Frontal, Ethmoid, or Fronto-ethmoid.
Other sinuses: very rare.


Mucocele

Pathogenesis:
Obstruction of sinus ostium→ Retention of mucus→ Expansion of the sinus→ Thinning out of bony wall of the sinus→ Destruction of this bony wall.

Clinical picture:
Symptoms:
- Facial pain and headache
- Swelling and proptosis

Signs:
- Swelling:

Above the medial half of the eye in frontal mucocele.
Medial to the eye in ethmoidal mucocele.
It shows egg - shell crackling sensation (due to thinning out of bony wall) then it becomes fluctuant (due to destruction of bony wall).
- Proptosis: it pushes the eyeball

Downwards and laterally in frontal mucocele.
Laterally in ethmoidal mucocele.


CT: Mucocele

N.B.: Infection→ pyocele leads to fever, throbbing pain and may rupture→ fistula.

Investigations:
- X-ray: Opacity and loss of scalloped appearance of frontal sinus.
- CT: more diagnostic.

Treatment:
Marsupialization of the inferior wall of the mucocele by endoscopic sinus surgery.

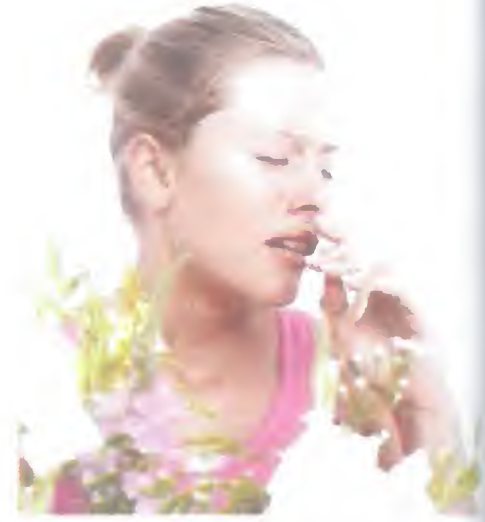
Allergic Rhinitis

Hypersensitivity of the mucosa of the nose and sinuses (mediated by IgE) to antigenic materials characterized by **recurrent attacks** of:

- **Sneezing**
- **Itching**
- **Rhinorrhoea** (bilateral, watery).
- **Nasal obstruction** (bilateral).

Types:

1- Seasonal: as hay fever.
2- Perennial: all round the year.
3- Perennial with seasonal exacerbations.



Sneezing + Itching + Rhinorrhoea

Causes:

- **Predisposing factors:**

1- Genetic: 50% of Allergic patients' give +ve family history.
2- Environmental: change in temperature and pollution.
3- Emotional: the attacks may be related to stress.

- **Exciting factors:** exposure to the antigen, which may be

1- Inhalants: * Pollens in Seasonal Rhinitis.
* House dust in Perennial Rhinitis.
2- Ingestants: as fish, milk and eggs.
3- Injectants: as penicillin.
4- Infectants: as fungal infection (Allergic fungal sinusitis).
5- Contacts: as face powder.

Mechanism (Pathogenesis):

- Exposure to the antigen (1st time) → formation of IgE antibodies, which become fixed to the mast cells of nasal mucosa.
- Re-exposure to the same antigen → the antigen will react with the antibodies (IgE) on the mast cells lead to degranulation and release of chemical mediators as histamine, serotonine and leukotrines.
- The actions of chemical mediators are:

1- Vasodilatation and increased capillary permeability.
2- Increased secretions by seromucinous glands.
3- Oedema of mucous membrane.
4- Smooth muscle contraction.
5- Cellular infiltrations with eosinophils.

Clinical picture:

Symptoms:

- Recurrent attacks of: Itching; sneezing; rhinorrhoea (bilateral watery nasal discharge); and nasal obstruction (bilateral).
- Other allergic manifestations: as allergic conjunctivitis, bronchial asthma or eczema.

Signs:

- The nasal mucosa may appear normal.
- The mucosa may become oedematous and pale bluish during the attack especially of turbinates that may be enlarged.
- Nasal polypi: may be present, coming from the ethmoid and passing through the middle meatus to nasal cavity.

Investigations:

1-Nasal **C**ytology → eosinophils.

2-Nasal **C**hallenge test: Inhalation of the antigen→Allergic manifestations.

3-**S**kin prick test → +ve test detected by the development of central wheel surrounded by erythema.

4- **S**erum IgE is elevated.

5- **R**AST (Radio-allergo-sorbant test): Application of the antigen to the patient's serum (contain antibodies) lead antigen-antibody reaction (in vitro).

Treatment:

A) Avoid exposure to the causative antigen (allergen avoidance).

B) Medical treatment (Pharmacotherapy):

- Antihistaminic: as Loratidine.
- Local decongestant nasal drops as Xylometazoline but prolonged use should be avoided (to avoid rhinitis medicamentosa).
- Cortisone: either local nasal spray (Beclomethazone) or systemic (Dexamethazone).
- Mast cell stabilizers: as Ketotifen.

C) Hypo-sensitization (immunotherapy):

Injection of gradually increasing doses of the causative antigen→ production of blocking antibodies (IgG), which bind to the antigen (on exposure) instead of IgE.

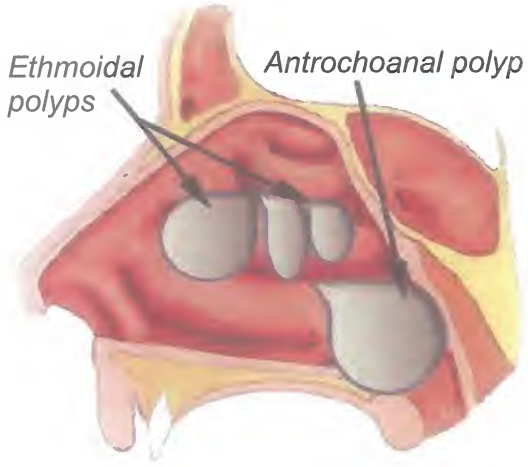
D) Surgical treatment: for obstruction

1- Reduction of enlarged inferior turbinates (as in hypertrophic rhinitis).

2- Removal of polyps by endoscopic sinus surgery (ESS).

Nasal polyps

Pedunculated oedematous mucosa prolapsed through middle meatus to the nasal cavity [either from the ethmoid → ethmoidal = Allergic polyps or from maxillary antrum = Antro-choanal polyp].



Causes:

1- Allergic rhinitis: associated with other allergic manifestations.

2- Inflammatory: ethmoidal sinusitis.

3- Both the above (allergic + inflammatory).

4- Allergic fungal sinusitis

Allergic (ethmoidal) Polyps

Pedunculated oedematous mucosa of the ethmoid prolapsed through the middle meatus to the nasal cavity.

Clinical picture:

Symptoms:

- Symptoms of allergic rhinitis but the obstruction is persistent.
- It is a predisposing for sinusitis lead to

Facial pain and headache

Mucopurulent nasal discharge.

Signs:

Anterior rhinoscopy: bilateral multiple glistening, pale bluish, soft, mobile and insensitive polypi coming from the middle meatus.

Investigations:

CT: is very important before the operation to detect any anatomical abnormality.

Treatment:

1) Medical treatment:

Anti-allergic treatment (steroid and antihistaminic).
Antibiotics for infection.

2) Surgical treatment:

a. Nasal polypectomy: avulsion by snare or Luc's forceps (high recurrent rate).
b. Ethmoidectomy: by ESS (the standard surgical treatment).

N.B.: Post-operative steroid spray is given to decrease the recurrence.

N.B.: The ethmoid is the source of polypi, as their mucosa is loosely attached and descends by gravity.

CT: Allergic (ethmoidal) polyps

Antro-choanal polyp

Pedunculated oedematous mucosa of maxillary antrum prolapsed through middle meatus to the nasal cavity then posteriorly to the nasopharynx passing from the choana.

Cause:

Unknown, may be inflammatory as there is no oesinophils in the polyp

Clinical picture:

Symptoms:

- Unilateral nasal obstruction.
- Unilateral nasal discharge.

Signs:

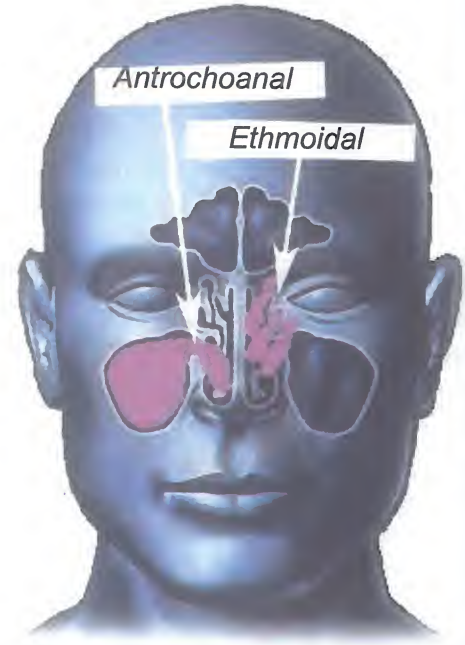
-Anterior rhinoscopy: single, unilateral, pale bluish, soft, and jelly - like polyp.
-Posterior rhinoscopy: The polyp is seen in the nasopharynx passing from the choana.

Investigations:

CT: is diagnostic (polyp filling the antrum and passing to the choana).

Treatment:

1- Endoscopic sinus surgery (ESS) and removal of polyp is the the standard treatment.
2- Radical antrum operation: may be used in recurrent cases.



N.B.: Allergic polyps = bilateral and multiple (with allergic criteria), while Antro-choanal polyp = unilateral and single (without allergic criteria).

Vasomotor Rhinitis (Intrensic rhinitis)

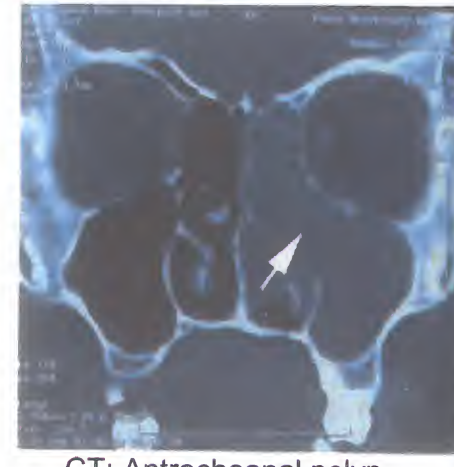
Non-allergic perennial rhinitis due to disturbance of autonomic nerve supply of the nose (parasympathetic part).

Clinical picture:

Similar to allergic rhinitis

Treatment:

A) Medical: Local cortisone nasal spray may be tried.
B) Surgical: Reduction of enlarged inferior turbinates ± Vidian nerve neurectomy (parasympathetic only).



CT: Antrochoanal polyp

Tumours of the nose and sinuses

Benign tumours

Osteoma

It is the commonest benign tumour of nose and sinuses in Arab population.

Site: frontal, ethmoid or fronto-ethmoid.

Types:

1- Ivory: from compact bone (Frontal).

2- Cancellous: from cancellous bone (Ethmoid).

Clinical picture:

Symptoms:

- Asymptomatic (if small)
- Facial pain and headache
- Swelling and proptosis

Signs:

- Hard-bony swelling at the inner canthus (ethmoid) or above the medial half of the eye (frontal) or both.
- Proptosis.

Investigations:

X-ray: Radio-opaque mass.

CT: Shows the site, size and extension.

Treatment:

Surgical excision in symptomatic cases by:

- External frontoethmoidectomy operation.
- ESS may be tried.

Frontal osteoma

Papilloma

A) Squamous cell papilloma

Site: skin of vestibule.

Symptoms: unilateral nasal obstruction.

Signs: unilateral nasal mass.

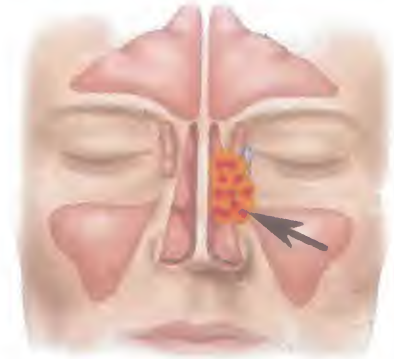
Treatment: excision either surgical or laser.

B) Inverted papilloma

(Schniederian or Transitional cell papilloma)

It is a benign tumour but locally destructive.

Site: It arises from the lateral wall of the nose at the junction between stratified squamous epithelium and respiratory epithelium (Schniederian membrane).



Clinical picture:

Symptoms: unilateral nasal obstruction, discharge, sometimes epistaxis.

Signs: unilateral nasal mass.

Investigations:

CT: shows site, size and extension.

Biopsy.

Treatment:

Medial maxillectomy with complete excision of the tumour either endoscopic (recent) or by external lateral rhinotomy (old treatment).


CT: Inverted papilloma

Prognosis:

Recurrence may occur and malignant transformation is 5-10%.

Haemangioma

It may be capillary, cavernous haemangioma or multiple telengectasia.
Treatment: excision (surgical or laser).

Locally malignant tumours

Adamantinoma

Origin: residues of dental lamina, more in mandible than maxilla.

Clinical picture:

Symptoms:

- Facial pain and swelling
- Loosening of teeth, and pathological fracture of mandible.

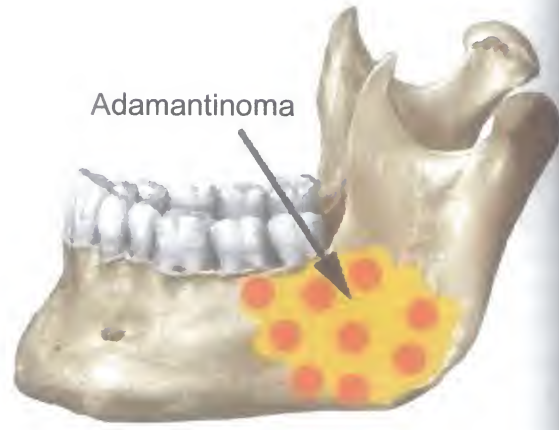
Signs:

Swelling with egg-shell crackling sensation on palpation.

Investigations:

- X-ray and CT: show multiple cysts.
- Biopsy.

Treatment: Surgical excision.



Osteoclastoma

It is locally malignant tumour give the soap bubble appearance on X-ray.

Fibrous dysplasia

It is not a true tumour.
It is a replacement of normal bone by woven bone and fibrous tissue.

Age: Teen-agers with arrest of growth at sexual maturity.

Site: Mandible and maxilla.

Types:

Monostotic: one bone is affected.
Polystotic: more than one bone.
Albright syndrome: more in females with unilateral polystotic fibrous dysplasia, skin pigmentation and endocrinal manifestations (as precocious puberty).

Clinical picture:

Symptoms:

- Facial swelling which is painless and slowly growing.
- Nasal obstruction, if it extends to nasal cavity.
- Proptosis, if it extends to the orbit.

Signs:

Hard, ill defined, diffuse swelling, which is not tender.

Investigations:

X-ray: shows ground glass appearance (characteristic).
CT: shows site, size, extension and ground glass appearance.

CT: Fibrous dysplasia

Treatment:

Surgical excision (just shaving) after the age of sexual maturity, through sublabial incision.

Malignant tumours

Age: Old (above 60 years).
Sex: More in males.

Predisposing factors:
- Exposure to nickel → squamous cell carcinoma
- Exposure to wood dust → adenocarcinoma.
- Irradiation.
- Smoking.

Pathology:

Gross picture:
- Shape: Ulcer, Cauliflower or Nodular infiltrative.
- Sites:

Maxillary sinus: 60%
Nasal cavity: 30%
Ethmoid sinus: 10%
Other sinuses: rare

Spread of nasal tumours

Microscopic picture:
- Squamous cell ca.: 80% (commonest).
- Adenocarcinoma: rare.
- Sarcoma: rare (in young age).
- Olfactory neuroblastoma: roof of the nose.

Spread:
a) Local spread to alveolus (down), orbit (up), pterygopaltine fossa (posterior), and brain (up), cheek (anterior).
b) Lymphatic spread: in 15% of cases:
-Anterior group of sinuses to submandibular, then to upper deep cervical lymph nodes.
-Posterior group of sinuses: to retropharyngeal then to upper deep cervical lymph nodes.
c) Blood spread: Lung, liver, bone, brain (LLBB).

Prognosis:
Bad due to close relation to the orbit and brain.

Clinical Picture:

Symptoms:

a- Symptoms of primary tumour:

. Tumour of nasal cavity:
Unilateral nasal obstruction, discharge and epistaxis especially in old patient who is not hypertensive should be well investigated.


Malignant tumour of left side of the nose

. Tumour of maxillary sinus:
The presentation is usually with local spread
-Downwards: unilateral dental pain, loosening of teeth, and/or oro-antral fistula.
-Upwards: proptosis, diplopia, ophthalmoplegia and diminution of vision.
-Posterior: trismus (by infeltration of pterygoids), and anaesthesia (by infeltration of maxillary nerve).
-Anterior: facial pain, swelling and ulceration.
-Medially: to nasal cavity, unilateral nasal obstruction, discharge and epistaxis.

. Tumour of ethmoid and roof of the nose:
Presents early with anosmia, proptosis and CSF rhinorhoea.

b- Symptoms of lymphatic spread (in 15%):
Submandibular or neck swelling

c- Symptoms of blood spread: **LLBB**
- Lung: cough, hemoptysis and chest pain.
- Liver: abdominal pain, jaundice and ascitis.
- Bone: bony aches and pathological fracture.
- Brain: symptoms of increased intracranial tension.

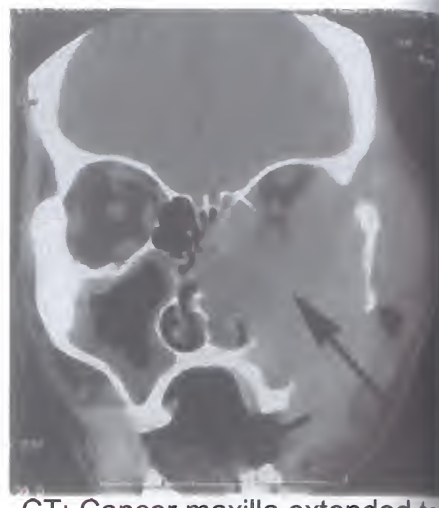
Signs:
a- Local examination:
Nasal: Anterior rhinoscopy shows unilateral nasal mass, which is friable and it bleeds on touch.

Neck: to exclude lymph node metastasis.

b- General examination:

To exclude distant metastasis.

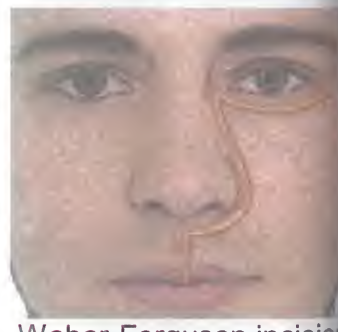
Investigations:
- CT: shows site, size, extension, bone destruction and detect lymph nodes metastasis.
- MRI: to detect intra-cranial and intra-orbital extension.
- Biopsy: by nasal endoscopy under local anaesthesia.


CT: Cancer maxilla extended to the nasal cavity and orbit

Treatment:
Combined treatment i.e. surgery and radiotherapy.
* Curative:
  - Surgery.
  - Post-operative radiotherapy.
  - Chemotherapy may be used.
* Palliative:
  - Pain killers (analgesics).
  - Palliative surgery.
  - Palliative radiotherapy and chemotherapy.


Moure's lateral rhinotomy

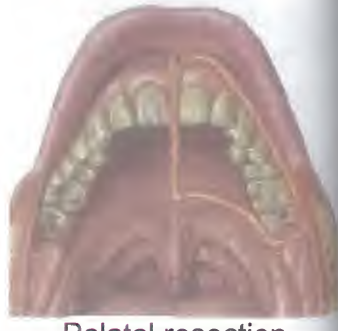
N.B.: *Palliative treatment is indicated in extensive tumours with intra-cranial extension or distant metastasis.*


Weber-Ferguson incision

Surgery for malignant tumours of the nose and sinuses:

(1) For primary tumour:

- Medial maxillectomy: through Moure's lateral rhinotomy: In localized tumour involving medial wall of maxilla.
- Palatal resection: through sub labial incision: In localized tumour involving inferior wall of maxilla.
- Total maxillectomy: through Weber-Ferguson incision: In large tumour involving the whole maxilla.
- Orbital exentration: If it involved the orbit or its periosteum.
- Craniofacial resection: if it reached to the roof the nose.


Palatal resection

(2) For Lymph nodes (LNs):
Radical neck dissection if there is LN enlargement.

Cysts of the nose and sinuses

1-Dermoid cyst (nasal dermoid)

In midline at the dorsum of the nose, sometimes it has connection to the intracranial cavity by fibrous tract through the foramen caecum.

Treatment: complete excision of the cyst and its tract.

2-Odontogenic cysts

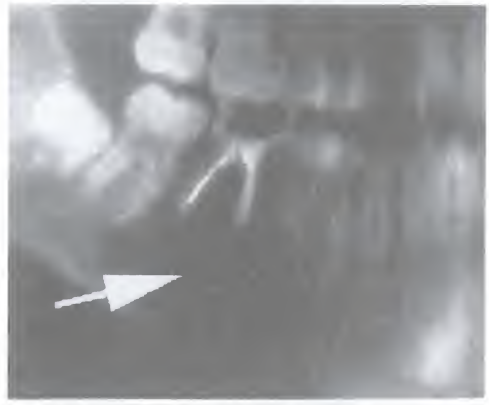
a) Dentigerous cyst:

- More common in children.
- Occurs around unerrupted tooth (more in the maxilla).
- X-ray or CT shows the unerrupted tooth inside the cyst.
- Treatment: excision.

Dentigerous cyst

b) Radicular (Dental) cyst:

- More common in adults
- Occurs around root of infected tooth (more in mandible).
- X-ray or CT shows the cyst around the root of infected tooth.
- Treatment: excision and removal of infected tooth.



Dental cyst

c) Cystic degeneration in adamantinoma.

3-Non-odontogenic cysts

a) Nasopalatine:

In the midline behind incisors within the nasopalatine canal.

b) Nasoalveolar (nasolabial):

In the nasolabial fold elevating the ala of the nose.

4-Mucocele

Cystic expansion of the sinus with mucus due to obstruction of its ostium.

Congenital nasal masses

- Nasal dermoid

It appears as a midline nasal mass.

It may have fibrous connection to the intracranial cavity.

- Encephalocele

Herniation of intra-cranial content through a defect in the skull.

It maintains a patent communication with the subarachnoid space.

It may appear as a nasal mass which is pulsatile, compressible and expand with crying.

- Glioma

Brain (glial) tissue that lost patent communication to the subarachnoid space.

It may have fibrous tract to the intracranial cavity.

Investigations

CT with contrast and/or MRI

Treatment

Surgical removal of the mass with its connection (repair of skull defect may be needed).

Glioma

Symptomatology

Nasal Obstruction

	Bilateral obstruction	*Unilateral obstruction*
Congenital	Choanal atresia (bilateral)	Choanal atresia (unilateral)
Traumatic	Fracture nose Septal haematoma.	Fracture nose. FB in nose.
Inflammatory	Acute non specific rhinitis Chronic rhinitis (specific and non-specific). Acute rhinosinusitis. Chronic rhinosinusitis. Septal abscess.	Diphtheria Unilateral rhinosinusitis. Allergic fungal sinusitis
Neoplastic	Malignant tumours of nose and sinuses (if extensive).	Benign and malignant tumours limited to one side.
Miscellaneous	Allergic rhinitis. Vasomotor rhinitis. Allergic polypi. Deviated septum (S-shaped).	Antro-choanal polyp. Deviated septum (C-shaped).
Nasopharyngeal causes	Adenoid. Tumour: as Benign: Angiofibroma. Malignant: Carcinoma	Small angiofibroma or carcinoma

Nasal Discharge It may be anterior or posterior nasal discharge.

	Bilateral discharge	*Unilateral discharge*
Watery	Acute non-specific rhinitis: (common cold) in catarrhal stage. Allergic rhinitis. Vasomotor rhinitis. Excessive lacrimation.	CSF rhinorrhoea
Water and food	Perforated palate (syphilis) Cleft palate. Paralysis of soft palate.	Oro-antral fistula.
Bloody	All causes of epistaxis (most probably general).	All causes of epistaxis (most probably local).
Mucopurulent and Purulent	Causes of bilateral nasal obstruction (stasis → Infection)	Causes of unilateral nasal obstruction.
Crusty	Atrophic rhinitis. All granuloma. Septal perforation.	Atrophic rhinitis (if unilateral as after turbinectomy).

Epistaxis

Bleeding per nose. It may be anterior nasal and/or post-nasal. Post-nasal bleeding may be swallowed, to be vomited later on and mis-diagnosed as hematemesis.

Causes of epistaxis

1) Local Causes:

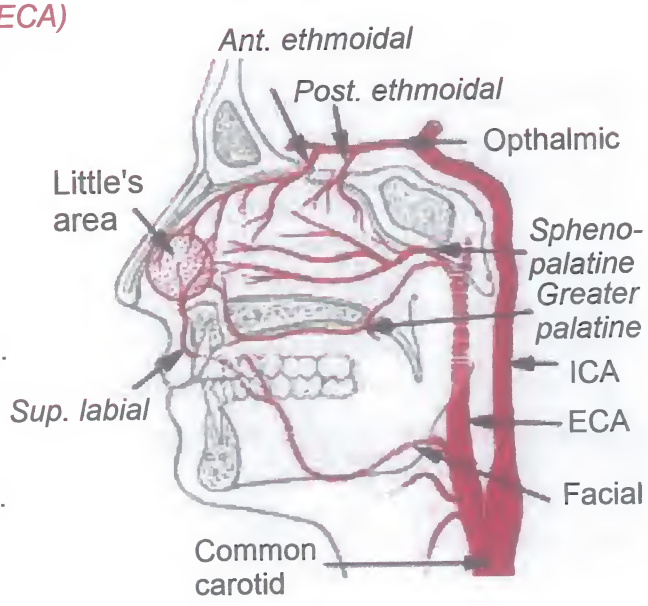
A- Idiopathic: The commonest cause (90%).
- Bleeding from Little's area.
- More common in children.
- Precipitated by minor trauma or hot dry atmosphere.

N.B.: Little's area (Kiesselbach's plexus):
Area of anastomosis between branches of external (ECA) and internal (ICA) carotid arteries at the antero-inferior part of the nasal septum. It is composed of:
- *Anterior ethmoid artery (of ophthalmic of ICA)*
- *Sphenopalatine artery (of maxillary of ECA)*
- *Greater palatine artery (of maxillary of ECA)*
- *Superior labial artery (of facial of ECA)*

B- Traumatic:
1- Accidental:
* Nose picking.
* F.B. in nose.
* Fracture nose.

2- Surgical: post-operative.

C- Inflammatory:
1- Acute rhinitis (specific and non specific).
3- Chronic rhinitis (specific and non specific).
4- Acute and chronic rhinosinusitis.



D- Neoplastic:
1- Nasal tumours:
Benign: hemangioma and telengectasia.
Malignant: carcinoma.
2- Nasopharyngeal tumours:
Benign: angiofibroma.
Malignant: carcinoma.

E- Miscellaneous: deviated septum leads to angulations and kinking of blood vessels.

2) General Causes:

A. Cardiovascular causes:
- ↑ Arterial blood pressure (Hypertension): it is the commonest cause in elderly.
- ↑ Venous blood pressure (superior mediastinal syndrome): obstruction of superior vena cava by mediastinal tumour, cardiomegaly, mitral stenosis, or emphysema.

B. Haematological causes:
- Defect in platelets → Thrombocytopenic purpura.
- Defect in co-agulation → Haemophilia.
- Antiplatelet drugs → Aspirin.
- Anti co-agulant drugs → Heparin.
- Leukaemia and Hodgkin's lymphoma.

C. Hepatic Causes: Liver cirrhosis and failure.→ hypoprothrombinaemia.
D. Fevers: Rheumatic fever and infective endocarditis → vasculitis.

Management of Epistaxis: FACT

A) First aid:

- The patient is placed in the sitting position with the head flexed forwards.
- The nose is pinched between 2 fingers.
- Application of cold compresses.
- Ask the patient to spit and not to swallow blood.
- Introduction of cotton piece soaked with vasoconstrictor into the nose for 10 minutes.

***N.B.**: Vasoconstrictor used is:*
Adrenaline (Epinephrine).
Or Ephedrine (in hypertensive patients).

First aid measures of epistaxis

B) Assessment: to reach the diagnosis (cause)

1- History:
- The bleeding is unilateral or bilateral.
- It is recurrent or not.
- History of systemic disease (Hypertension or blood disease).
- History of drug intake (as aspirin).

2- Examination:
- **S**ide of bleeding: unilateral or bilateral.
- **S**ite of bleeding:

*Little's area: is the commonest site.
*Bleeding from above the middle turbinate: the source is ant. or post. ethmoidal artery.
*Bleeding from posterior, below middle turbinate: the source is sphenopalatine artery.

- **S**everity of bleeding: mild or severe (shock)
- **S**hock: detected by tachycardia (weak rapid pulse), tachypnea (rapid respiration), hypotension, cold clammy sweat, oligurea, and restlessness with irritability.

3- Investigations to detect the cause:
* Co-agulation profile:
- Bleeding time.
- Clotting time.
- Prothrombin time and concentration.
- Partial thromboplastin time.

* Complete blood count (CBC).
* CT of nose and paranasal sinuses (if a tumour was suspected).
* Biopsy from a tumour.

C) Control of bleeding: According to severity

I. Mild epistaxis: controlled **by either**

a. Cauterization: done after cessation of bleeding and when the bleeding point is seen.

For anterior epistaxis: by either
- Chemical cautery (Silver nitrate or Chromic acid crystals)
- Electrocautery: under local (in adults) or general anaesthesia (in children).
- Laser can be used to co-agulate the bleeding vessels.

For posterior epistaxis:
Endoscopis electrocauterization using bipolar diathermy.

b. Nasal packing: done if cauterization failed and in active bleeding.

II. Severe epistaxis:

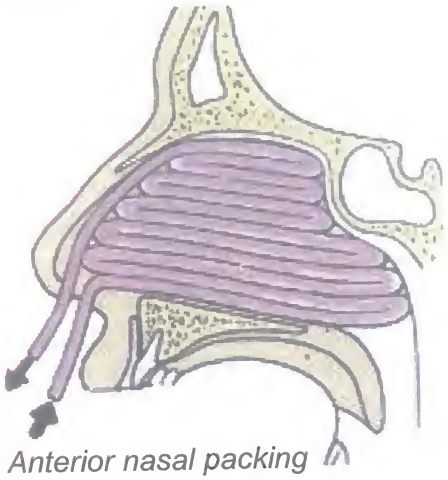
Control of bleeding and management of shock should be performed simultaneously. Control of bleeding by nasal packing, surgery or embolization.

a. **Nasal packing**: either

1- Anterior nasal packing:

- Using ribbon gauze impregnated with vaseline (lubricant) and antibiotic ointment.
- Introduced in layers from below upwards.
- The pack is left for 24-48 hours.

Alternative method: compressed foam (Merocel) is introduced into the nose, it is hygroscopic and expands with absorption of fluid causing compression.

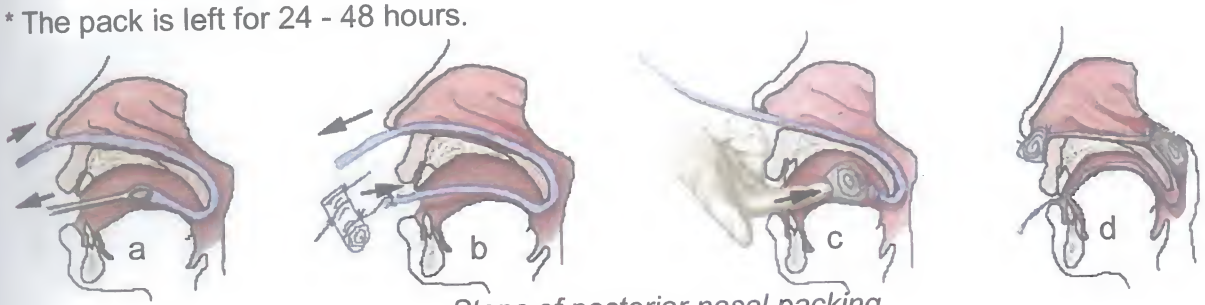


Anterior nasal packing

2- Posterior nasal packing:

- Done if the anterior packing failed to control the bleeding or in cases of posterior bleeding
- Steps: (under general anaesthesia).

a- Introduce 2 rubber catheters through the nose; get them out from the mouth.
b- Tie the thread of an already prepared gauze pack ($^1/_2$ inch) to its oral end and withdraw the catheters from the nose.
c- Pull the thread from the nose and fix the pack in the nasopharynx.
d- Finally, we have a piece of gauze impacted in the nasopharynx and 2 threads passed from nostrils tied together. Another thread tied to the pack and passed from mouth to be used for removal of the pack later on.
e- Do anterior nasal pack.
* The pack is left for 24 - 48 hours.



Steps of posterior nasal packing

Alternative method: inflatable ballon or Foley's catheter can be used to stop posterior bleeding.

b. **Surgery:**

Is indicated if packing fails to stop bleeding: according to the source of bleeding

1- Maxillary artery ligation:

* If the bleeding from posterior part of nose (sphenopalatine artery).
* Removal of the anterior wall of the maxillary sinus, then removal of posterior wall, and ligatation of the maxillary artery in pterygo-palatine fossa.

N.B.: *Ligation of ECA (ext. carotid artery) is less effective due to cross anastomosis.*

2- Ethmoidal arteries ligation:

* If the bleeding from superior part of the nose (ant. and post. ethmoidal arteries).
* Ligatation of the arteries through the orbital periosteum.

c. **Embolization:**

Angiography is done to detect the bleeding vessel then injection of embolus to close it.

D) Treatment of the underlying cause: (if identified)

* Deviated septum → SMR or Septoplasty.
* Tumours → Surgical removal.
* Hypertension → Antihypertensives.
* Management of blood disease (Co-agulation factors and vitamin K).

N.B.: Management of Shock:

It is an acute circulatory failure leads to lack of tissue perfusion.

Clinical picture: see assessment of epistaxis

Assessment of shocked patient:

- Measurment of pulse rate and blood pressure.
- Send blood sample for grouping and full blood count.
- Gain intravenous access.

Treatment:

1- Complete bed rest with the head low down.
2- Sedatives; as diazepam, avoid morphia (to avoid respiratory center depression).
3- I.V. Fluids especially fresh blood in severe cases.
4- Warming of the patient.

Headache and facial pain

Its cause may be extracranial or intracranial

Extracranial causes may be:

1- Nasal (rhinogenic headache):

- Infection: Acute and chronic rhinosinusitis.

* Its site depends on the affected sinus.
* It is more severe in the morning.
*↑ By coughing, straining and leaning forwards.

Headache

N.B.: Vacuum headache:

Cause: obstruction of the frontal recess (opening of the frontal sinus) as in:

- *Frontal sinusitis.*
- *Deviated septum causing obstruction of the recess.*

It is characterized by periodic attacks (starts in the morning, increases in the mid-day, and subsides by the end of the day) this is due to absorption of air of the sinus.

N.B.: Contact headache:

Cause: contact of medial (septum) and lateral walls (m. turbinate) in deviated septum.

- Malignant tumour of nose or sinuses.

2- Aural:

- Infection: Otitis externa, AOM (before perforation) and complicated otitis media.

N.B.: CSOM is never painful except in: complication, acute exacerbation or rarely malignant transformation.

- Tumour: Glomus, carcinoma, acoustic neuroma.

3- Ocular:

- Infection: orbital cellulites or abscess.
- Tumour: orbital tumour.
- Errors of refraction and Glucoma.

N.B.: Ocular headache of errors of refraction is more severe by the end of the day.

4- Dental:
- Infection: dental caries or peri-apical abscess.
- Trauma: post-extraction neuralgia (phantom tooth).

N.B.: Dental caries is the commonest cause of facial pain.

Trigeminal nerve

5- Tempromandibular joint (TMJ):
- TMJ arthritis.
- Costen's syndrome: TMJ pain, deafness and tinnitus.

6- Cervical: Cervical spondylosis, and neck muscle spasm.

7- Neuralgias:

A. Trigeminal neuralgia:
- Paroxysmal attacks of pain along the distribution of trigeminal nerve.
- Precipitated by Stimulation of trigeminal nerve as teeth brushing.
- The cause is unknown (may be vascular loop compressing the nerve).
- Treatment:

* Medical: Carbamazepin (Tegretol)
* Surgical: by either Injection of trigeminal ganglion with alcohol.
  Trigeminal neurectomy
  Decompression of the vascular loop.

B. Glossopharyngeal neuralgia:
- Paroxysmal attacks of pain along the distribution of glossopharyngeal nerve.
- Precipitated by stimulation of glossopharyngeal nerve as swallowing.
- The cause is unknown (may be long styloid process compressing the nerve).
- Treatment:

* Medical: Carbamazepin (Tegretol).
* Surgical: by either Glossopharyngeal neurectomy.
  Fracture of long styloid process.

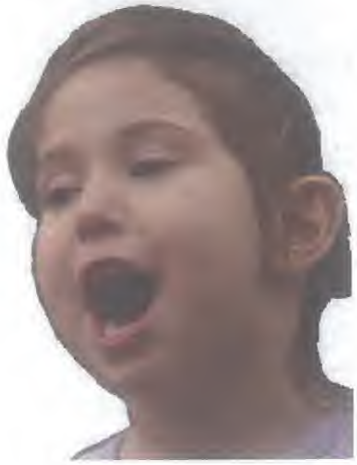
8 - Vascular:

Migraine
- Recurrent attacks of hemicranial pain preceded by an aura (as flashes of light).
- Mechanism: Vasospasm → aura, then vasodilatation → headache.
- Positive family history in most cases.
- Treatment: Cafergot (Ergotamine + Caffeine), beta-blocker may be used for prophylaxis.

Cluster headache

Unilateral frontal and/or temporal headache, associated with lacrimation, rhinorrhoea and nasal obstruction which is of unkowon cause.

9- General:
- Systemic infections and Toxaemia.
- Constipation.
- Hypertension.



Mouth breather

Mouth breathing

Causes:

All causes of bilateral nasal obstruction.

Effects:

1-ENT complications: the nose loses its function, leads to:

- Nasal:

a) **S**inusitis and rhinitis (atrophy of ciliary mucosa → infection)

b) **S**uckling difficulty in infants.
c) **S**peech difficulty (nasal tone of voice i.e. rhinolalia clausa).
d) **S**noring and sleep apnea.
e) **S**mell disorders

- Oral and pharyngeal:

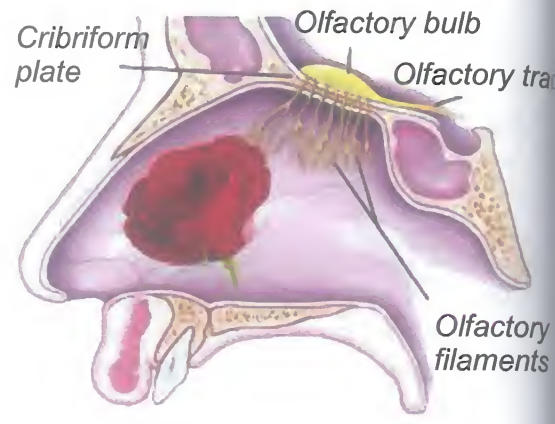
Dry mouth → infections of teeth; pharynx and tonsils.

- Laryngeal and pulmonary:

a) Infections: as laryngitis, bronchitis.
b) Pigeon chest.

- Facial: Adenoid facies (see throat).

2-General complications: caused by hypoxia and ↑ Co_2 lead to sleep apnea syndrome with its complications (see throat).



Smell disorders

To smell, 3 factors should be present:
1- Odoriferous material.
2- Healthy moist olfactory mucosa.
3- Healthy olfactory filaments and their central connection.

Types of disorders:

1) Anosmia: Loss of smell.
2) Hyposmia: Diminution of smell.

Causes:

1. Intra-nasal:
- All causes of nasal obstruction (e.g. allergic polypi).
- Atrophy of olfactory mucosa (atrophic rhinitis).
- Peripheral neuritis (of olfactory nerve) as after influenza or diabetes.

2. Cranial: Fracture base of skull involving cribriform plate.
3. Intracranial: Brain tumour compressing the olfactory pathway.

3) Cacosmia: Sensation of bad smell

Causes:

1- FB in the nose.
2- Sinusitis of dental origin.

4) Parosmia: Perverted sense of smell.

Causes:

Hysteria or epilepsy.

Proptosis

Protrusion of eyeball.

Proptosis

Causes:

1- Causes in the sinuses:
- Frontal sinus: as mucocele or tumour lead to downward and lateral proptosis.
- Ethmoid sinus: as mucocele, or tumour lead to lateral proptosis.
- Maxillary sinus: as tumour lead to upward proptosis.

2- Causes in the orbit: as orbital haematoma, abscess or tumour (foreward proptosis).
3- Causes in the lacrimal gland: lead to downward and medial proptosis.
4- Causes in the lacrimal sac: lead to lateral proptosis.
5- Causes in the nasopharynx: as nasopharyngeal angiofibroma or carcinoma.
6- Cavernous sinus thrombosis: lead to pulsating proptosis.
7- Endocrinal causes: Thyrotoxicosis.

1.
2.
3.
4.
5.

Operations

Operations to correct deviated nasal septum; either:

a. Submucous resection of the septum (SMR)

Removal (resection) of the deviated portion of the septal cartilage ± bone.

Indications:

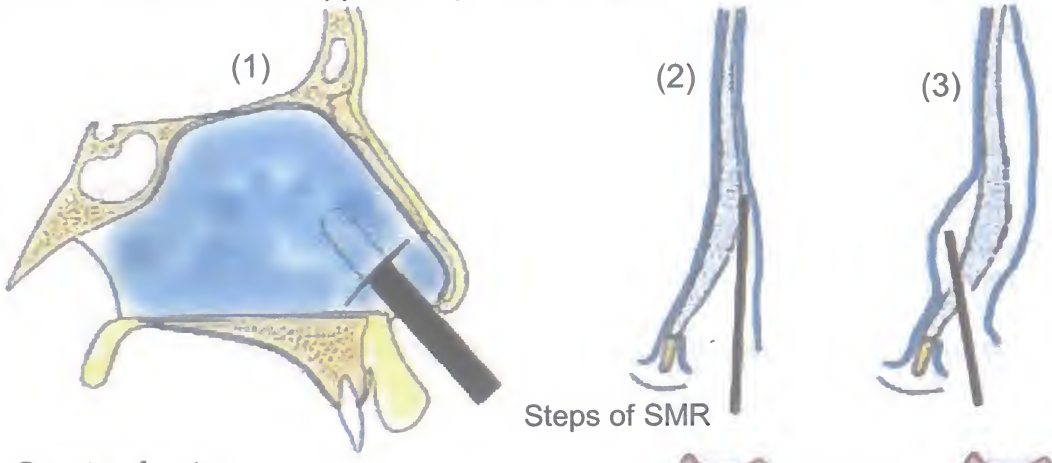
Symptomatizing deviated septum.

Contraindications:

- Before the age of 18 years as removal of cartilage will interfere with the growth of face.
- Presence of septal dislocation.

Technique:

- Anaesthesia: General or local.
- Incision: vertical in the mucoperichondrium in one side, behind anterior end of the septum **(1)**.
- Elevatation of mucoperichondrial flap of this side **(2)**, an incision is deepened in the cartilage more posterior to the previous incision, the mucoperichordrial flap is elevated on the other side **(3)**.
- The deviated cartilage (± bone) is removed, and then mucoperichondrial flaps are repositioned in midline and supported by nasal pack for 48 hours.



Steps of SMR

b. Septoplasty

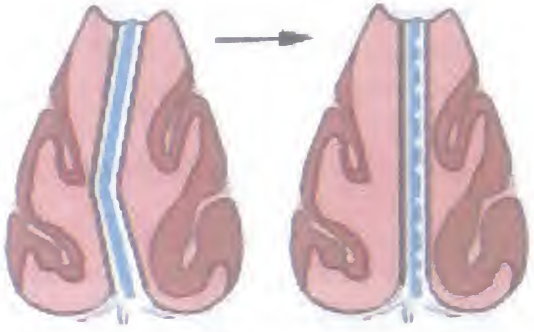
Straightening of the spetal cartilage without (or with minimal) removal.

Indications:

- Symptomatizing deviated septum at any age.
- Septal dislocation.

Technique:

- Anaesthesia: General or local.
- Incision: at the anterior end of the septum (which may be dislocated) with elevation of mucoperichondial flaps and straightening of deviated portion.



Septoplasty

Complications of SMR and Septoplasty: **(APCD)**

1. **A**nesthetic complications.
2. **P**ost-operative haemorrhage, haematoma, infection (septal abscess and sinusitis), and adhesions between septum and turbinate (it is the commonest complication).
3. **P**erforation of the septum (more in SMR, less in Septoplasty).
4. **C**SF Rhinorrhoea (trauma to cribriform plate).
5. **D**eformity: Supratip depression (in SMR and not in septoplasty).

Antral puncture and lavage

Puncture of the maxillary sinus below the inferior turbinate, and then washing it.

Indications:

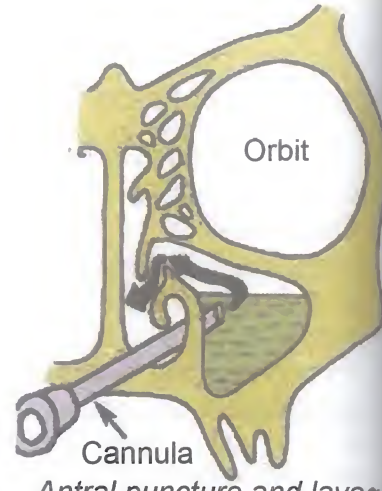
It was used in the past for treatment of chronic and recurrent acute sinusitis.

Contraindications:

Children (small sinus) [to avoid orbital injury]
Hypoplastic maxillary sinus [to avoid orbital injury].

Technique:

- Anaesthesia: Local
- Trocar and cannula are introduced below the inferior turbinate, one inch behind its anterior end, directed towards the outer canthus, pushing the trocar and cannula lead to penetration of the medial antral wall.
- The trocar is removed and the sinus is washed through the cannula with warm saline.



Antral puncture and lavage

Complications:

Injury to the cheek if the trocar is directed anterior.
Injury to the orbit if the trocar is directed superior.

Inferior intranasal antrostomy

Creation of wide opening (stoma) below inferior turbinate.

Indications:

It was used in chronic sinusitis after failure of repeated puncture and lavage.

Disadvantage:

It is obsolete nowadays, as it is against the direction of ciliary movement.

Inferior intranasal antrostomy

Radical antrum (Caldwell-Luc) operation

Removal of the mucosa of the maxillary antrum and making inferior intranasal antrostomy.

Indications:

1. It was used in the past for treatment of chronic sinusitis after failure of repeated puncture and intra-nasal inferior antrostomy.

   ***N.B.: FESS** is the recent standard surgical treatment for chronic sinusitis.*
2. Recurrent antro-choanal polyp.
3. Oro-antral fistula (to clean the sinus).
4. Benign tumour.
5. Ligation of maxillary artery in epistaxis.
6. Removal of foreign body (as retained dental root).

Technique:

- Anaesthesia: General
- Incision: Sub labial
- The periosteum of anterior wall of the sinus is elevated.
- An opening is made in the anterior wall of the sinus.
- The mucosa is removed by curette.
- Inferior intra-nasal antrostomy is performed.


Radical antrum operation

- The sinus is packed with vaseline gauze impregnated with antibiotic, to be removed after 48 hours.

Complications:

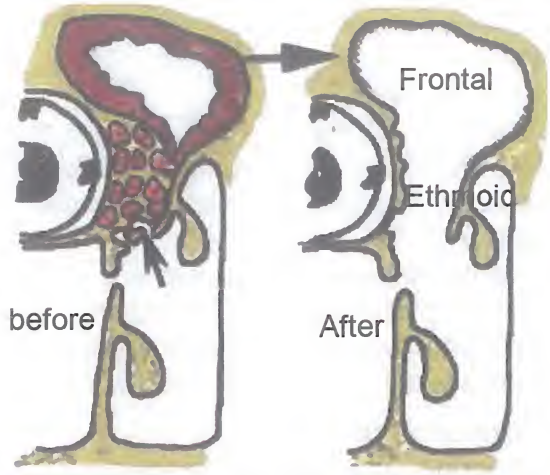
1- Injury to infra-orbital nerve leading to numbness and loss of cheek sensation.
2- Post-operative oedema of the cheek.
3- Recurrence of the disease (sinusitis).

External fronto-ethmoidectomy

Opening of the frontal sinus and removal of ethmoid sinus.

Indications:

1. Chronic frontal and/or ethmoidal sinusitis (not used nowadays being replaced by FESS).
2. Complicated ethmoidal sinusitis (replaced by FESS).
3. Recurrent extensive allergic Polypi (replaced by FESS).
4. Mucocele (replaced by FESS).
5. Osteoma.
6. Ligation of ethmoidal arteries in epistaxis.
7. Repair of dura in CSF rhinorrhoea (replaced by FESS).



Fronto-ethmoidectomy

Technique:

- Anaesthesia: General.
- Incision: Medial to inner canthus (scar formation is a major disadvantage).
- The periosteum and lacrimal sac are elevated laterally.
- The medial orbital wall is penetrated.
- The ethmoidal cells are exenterated.
- The floor of the frontal sinus is opened.
- Drainage tube is inserted to be removed 6 weeks to 6 months later.

Nasal Endoscopy

Direct visualization of nose and sinuses by the use of endoscopes.


Nasal endoscope

Types of Endoscope: Rigid and has special angle and special diameter

Angle: 0°, 30° or 70°
Diameter: 2.7mm or 4mm

Indications:

A) Diagnostic endoscopy:

-The best endoscope is 0° (angle) with 2.7mm in diameter.
-Before endoscopy, the nose is anaethetised with spray (Xylocaine) and packed with adrenaline (vasoconstrictor).

It is used in the following:

1- Rhinosinusitis (sinusitis): detection of discharge site.
2- Chronic nasal obstruction: detection of the cause.
3- CSF rhinorrhoea: detection of leakage site.
4- Epistaxis: detection of bleeding site.
5- Foreign body in hidden area.
6- Follow-up after nasal operations: detection of adhesion.
7- Biopsy from nasal or nasopharyngeal tumours.
8- Unilateral secretory otitis media in old age: detection of nasopharyngeal carcinoma.


Nasal endoscopy

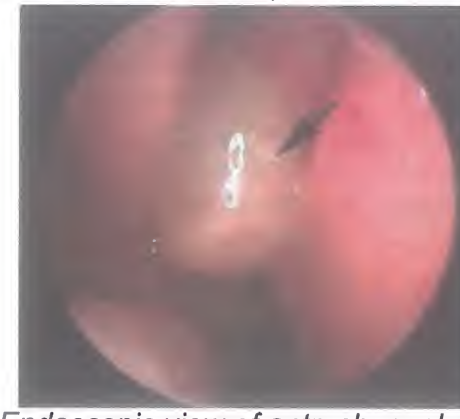
B) Therapeutic endoscopy (Endoscopic sinus surgery [ESS]):

- Chronic or recurrent acute sinusitis (the operation is called FESS).

- It is also used in the following: ABCDEF

1. Allergic polypi and allegic fungal sinusitis (A).
2. Antro-choanal polyp (A).
3. Benign tumour of nose and sinuses (B)
4. Blow out fracture of orbit (B).
5. Choanal atresia (C).
6. CSF rhinorrhoea (C).
7. DCR [dacryocystorhinostomy] (D).
8. Decompression of orbit and optic nerve (D).
9. Epistaxis (E).
10. Fronto-ethmoidal mucocele (F).

N.B. Septoplasty and turbinectomy may be done endoscopically, also medial maxillectomy (for removal of inverted papilloma which is a benign tumour).



Endoscopic view of antrochoanal polyp

Contraindications:

Malignant tumours should not be removed endoscopically, as open surgery enable the surgeon to remove a safty margin around.

Complications:

1. **Major:** ABCD
   A) **A**nesthetic complications as anaphylactic shock, succinyle **a**pnea and cardiac **a**rrest.
   B) **B**rain injury: CSF rhinorrhoea and meningitis.
   C) **C**arotid injury: fatal haemorrhage.
   D) **D**iplopia and loss of vision (optic injury).
2. **Minor:** AASEE
   - **A**nosmia
   - **A**dhesions (intranasal).
   - **S**inusitis (recurrence).
   - **E**pistaxis.
   - **E**cchymosis (orbital)

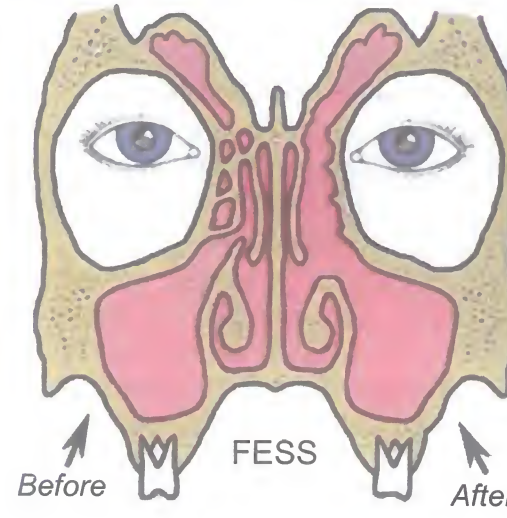
Endoscopic sinus surgery

Functional Endoscopic Sinus Surgery (FESS)

Intra-nasal endoscopic procedure, in which the diseased mucosa is removed (eradicated) while the healthy mucosa is preserved with restoration of normal drainage of sinuses (so it is called functional).

The technique consists of:

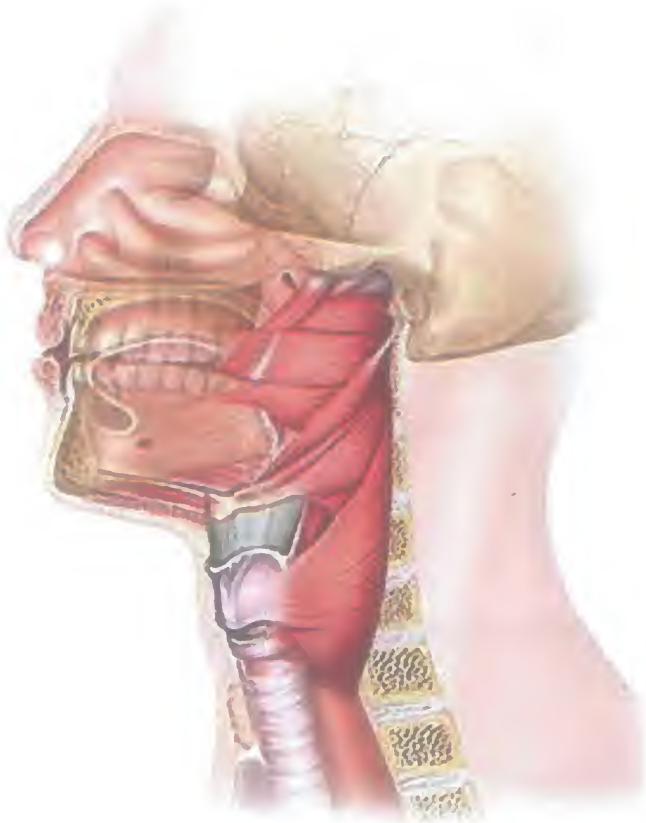
1- Correction of anatomical abnormality (as deviated septum…)
2- Anterior ethmoidectomy.
3- Middle meatal antrostomy (widening of maxillary ostium).
4- Posterior ethmoidectomy: if needed
5- Sphenoidotomy: if needed.
6- Clearance of the frontal recess: if needed.



Advantages:

1- Eradication of the disease.
2- Restoration of normal physiology (functional).

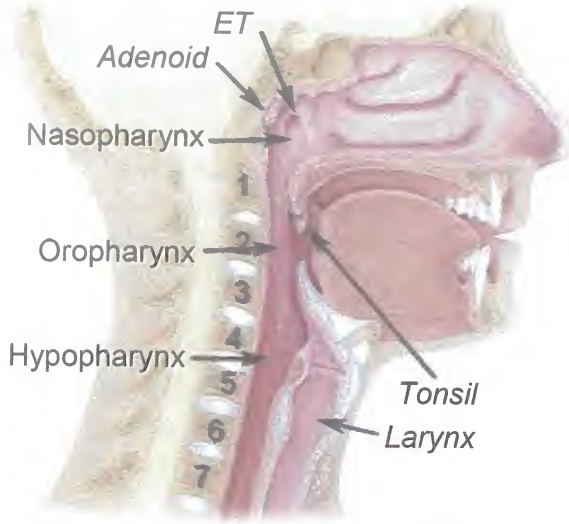
Throat



Pharynx

Anatomy

- It is a fibromuscular tube extends from the skull base to the 6th cervical vertebra.



- It is devided into:
Nasopharynx behind the nose (C_1).
Oropharynx behind the oral cavity (C_2 - C_3).
Hypopharynx behind the larynx (C_4 - C_6).

The nasopharynx:

- It extends from the skull base to the palate.
- It is behind the nose (choana).
- Features:

♦ *Roof:*
It contains sub-epithelial lymphoid tissues (When hypertrophied called adenoid)

♦ *Lateral wall:*
.Opening of Eustachian tube (ET): lies 1cm behind the posterior end of the inferior turbinate.
.Tubal elevation or torous tubarius: caused by ET.
.Pharyngeal recess or fossa of Rosen muller: above and behind ET opening.

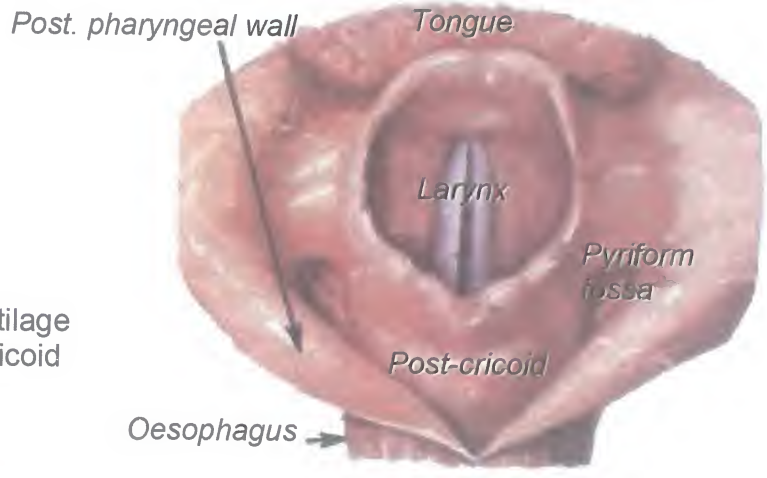
Oropharynx

The oropharynx:

- It extends from the palate to the tip of epiglottis.
- Behind the oral cavity.
- Features:
The palatine tonsils present on each side of oropharynx between the pillars of fauces.

The hypopharynx:

- It extends from tip of epiglottis to the lower border of cricoid cartilage.
- Behind the larynx.
- It consists of 3 areas:



a. Pyriform Fossa:
- Laterally: Thyroid cartilage and thyrohyoid membrane.
- Medially: Cricoid cartilage and aryepiglottic fold.

b. Postcricoid area:
Extends from the Arytenoid cartilage above to the lower border of Cricoid cartilage below.

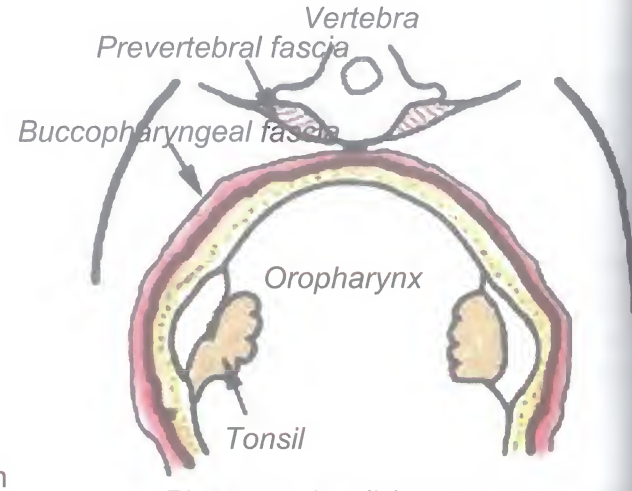
c. Posterior pharyngeal wall.

Pharyngeal wall is formed of:

- ***Mucosal layer:*** stratified squamous epithelium except the nasopharynx lined with respiratory epithelium.
- ***Submucosal connective tissue.***
- ***Muscular layer:***

Main pharyngeal muscles: superior, middle, and inferior constrictors.
Accessory pharyngeal muscles: stylo-, salpingo-, and palato- pharyngeus muscles.

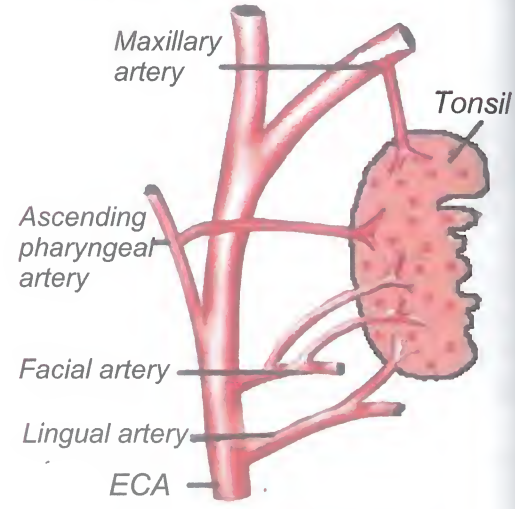
- ***Buccopharyngeal fascia:*** covers the pharynx from outside, it is seperated from prevertebral fascia by retropharyngeal space (both fascias are connected in mid-line by median raphe).



Pharyngeal wall (transverse section)

Blood Supply of the pharynx and tonsil:

1- **A**scending pharyngeal artery from external carotid artery (ECA).
2- **A**scending palatine artery from facial artery.
3- **D**escending palatine artery from maxillary artey.
4- **D**orsalis lingual artery from lingual artery.
5- **T**onsillar artery from facial artery.



Blood supply

Venous drainage:

Pharyngeal plexus → Internal jugular vein (IJV).

Nerve Supply:

- ***Motor:*** all pharyngeal and palatal muscles are supplied from pharyngeal plexus (vagus) except 2 muscles:
Tensor palati: by trigeminal nerve.
Stylopharyngeus: by glossopharyngeal nerve.
- ***Sensory:*** from pharyngeal plexus (glossopharyngeal), except the hypopharynx from glossopharyngeal and vagus (which is the main).

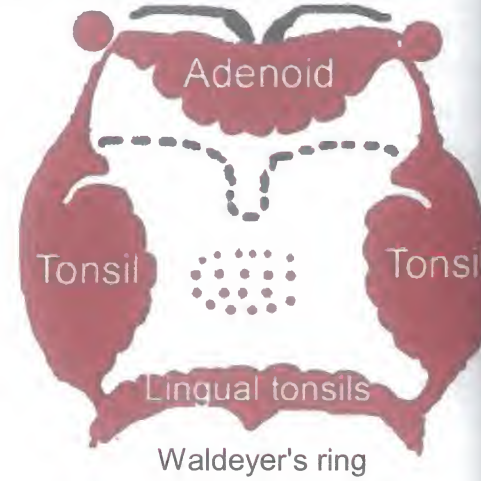
N.B.: *Pharyngeal plexus of nerves is formed of:*
- Motor (vagus)
- Sensory (Glossopharyngeal).

Lymphatic drainage:

Retropharyngeal lymph nodes (LNs) to the deep cervical LNs.

Waldeyer's ring:

- It is a ring of lymphoid tissues present in the subepithelial connective tissues in the upper part of aerodigestive tract.



Waldeyer's ring

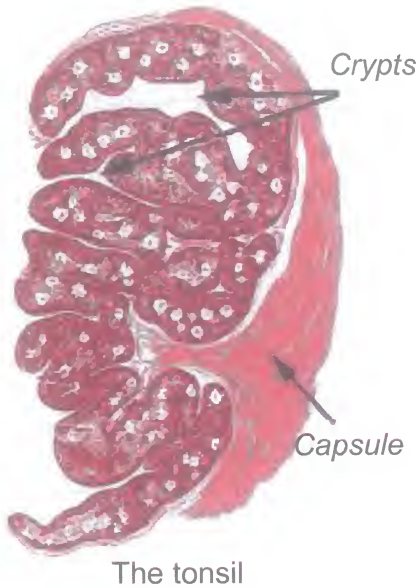
- It has no afferent lymphatic vessels and has only efferent lymphatics (i.e. secretes anibodies directly as it has direct contact with the organisms).

- It is drained in retropharyngeal LNs then to the upper deep cervical LNs.
- It consists of:
1- Nasopharyngeal lymphoid tissue.
2- Tubal tonsil (around the Eustachian tube).
3- Palatine tonsils (in the oropharynx).
4- Lingual tonsils (at the base of the tongue).
5- Lymphoid follicles in the posterior pharyngeal wall.

Anatomy of the tonsils

. Two almond shaped masses of lymphoid tissues present on each side of oropharynx between anterior and posterior pillars (in the tonsilar fossa).

. Descreption of the tonsil:
- Upper pole → reaches to the soft palate.
- Lower pole → reaches to the tongue.
- Lateral surface → covered by capsule separate it from its bed (superior constrictor muscle).
- Medial surface → covered by stratified sq. epith. of oropharynx, showing 12-15 invaginations called crypts, the largest one (upper one) is called crypta magna.



The tonsil

. Blood supply: the same as the pharynx.

. Venous drainage: paratonsillar vien to pharyngeal plexus to IJV.

. Lymphatic drainage: to Jugulodiagastric LNs (part of upper deep cervical LNs).

. Functions: protective functions, the tonsils play role in humoral and cell-mediated immunity in the childhood period (they secrete antibodies).

Physiology

The pharynx has the following functions:

1.Respiratory channel.

2.Food channel (Deglutition).

3.Articulation of speech.

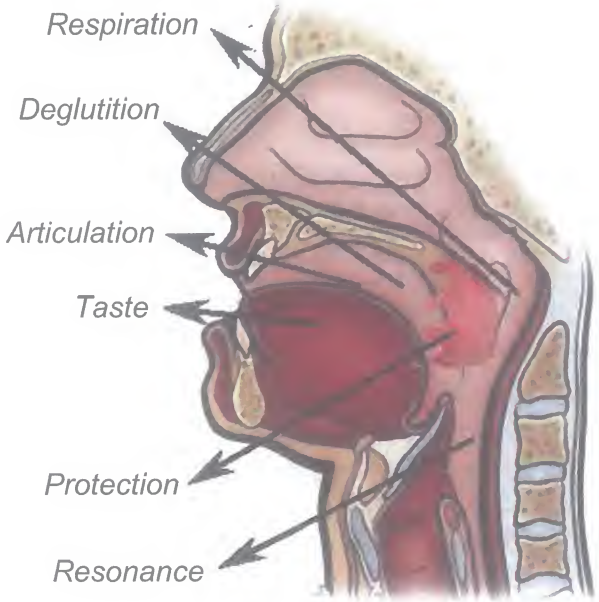
4.Resonance of voice:

Nasopharyngeal obstruction leads to nasal tone of voice (hyponasality), and oropharyngeal obstruction leads to hot potato voice

5. Taste (tongue base)

6. Protective function:

By formation of antibodies by the lymphoid tissues of the Waldeyer's ring.



Deglutition: *Consists of 3 stages.*
1st stage: Oral → Voluntary.
2nd stage: Pharyngeal → Involuntary.
3rd stage: Oesophageal → Involuntary.

Symptoms and methods of pharyngeal examination

Before studying pharyngeal diseases, you should know what are the symptoms, and how to examine patients with pharyngeal problems (detailed history taking and clinical examination were discussed in chapter of clinical ENT)

Symptoms of pharyngeal diseases: see clinical ENT

- Dysphagia (difficulty of swallowing)
- Hoareseness and stridor: if pharyngeal diseases affect the larynx
- Hot potato voice: if there is impairment of resonance
- Snoring and sleep apnea: if the pharyngeal airway is narrowed
- Foetor oris (halitosis): bad mouth odour
- Loss of weight: caused by prolonged dysphagia
- Regurgitation of food and fluids.
- Pain: referred to ear through Jackbson's nerve of glossopharyngeal.
- Trismus: due to pterygoid muscle spasm.
- Neck swelling: as lymph nodes.
- Symptoms of distant metastasis (in malignancy)

Indirect laryngoscopy

Methods of pharyngeal examination:

see clinical ENT

Nasopharynx:

- Nasal endoscopy (rigid)
- Flexible nasopharyngoscopy.
- Posterior rhinoscopy.
- Digital palapation: not used nowadays.

Rigid laryngoscopy

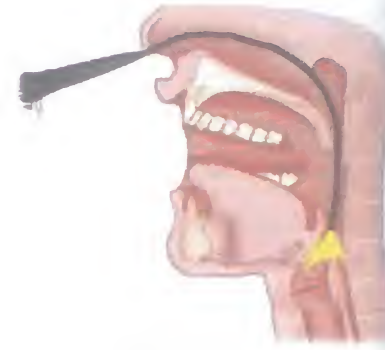
Oropharynx:

- Inspection of the oral cavity and oropharynx.
- Palpation can be done for masses (tumours).

Hypopharynx:

It is situated behind the larynx

- External examination: inspection and palpation including moure's sign (see clinical ENT).
- Indirect laryngoscopy: using laryngeal mirror.
- Rigid Hopkins laryngoscopy: using rigid Hopkin's laryngoscope through the mouth.
- Flexible laryngoscopy: using flexible fibroptic laryngoscope through the nose.
- Hypopharyngoscopy: using rigid wide tube through the mouth downwards under anesthesia.



Flexible laryngoscopy

Neck examination:

Inspection and palpation of swellings especially lymph nodes.

Diseases of the pharynx

- Congenital:
Cleft palate (see palate)

- Traumatic:
Discussed in chapter of the oesophagus:
- Foreign body in the hypopharynx.
- Corrosive ingestion.

- Inflammatory:

A. Acute:
- Non specific pharyngitis
- Specific pharyngitis:
    1. Diphtheria.
    2. Vincent's angina.
    3. Moniliasis.
- Blood diseases: when the immunity decreased, the commensals attack the pharynx as in:
    1. Agranulocytosis.
    2. Leukaemia.
    3. Infectious mononucleosis.

B. Chronic:
- Non specific:
Chronic non specific simple pharyngitis.
Plummer-Vinson syndrome (Chronic pharyngo-oesophagitis)
- Specific pharyngitis:
    1. Scleroma.
    2. T.B.
    3. Syphilis.

C. Inflammations of lymphoid tissues:
1. Adenoid.
2. Tonsillitis.

D. Pharyngeal suppurations:
Infection in the spaces around the pharynx

- Neoplastic:

Tumours of the nasopharynx:
Benign: angiofibroma
Malignant: carcinoma and lymphoma

Tumours of the oropharynx:
Benign: papilloma and adenoma
Malignant: carcinoma and lymphoma

Tumours of hypopharynx:
Benign: leiomyoma (very rare).
Malignant: carcinoma.

- Miscellaneus:
Pharyngeal pouch
Pharyngeal and palatal paralysis (discussed in chapter of the palate)

Adenoid

Hypertrophy of lymphoid tissue of the nasopharynx sufficient to produce symptoms.

N.B.: *It is the commonest nasopharyngeal swelling.*

Age: childhood period

Cause: repeated upper respiratory tract infection.

Clinical picture:

Symptoms:

1- Effects of hypertrophy:

A) Bilateral nasal obstruction:

- **S**noring and **s**leep apnea.
- Difficult **s**uckling in infants.
- Rhinolalia clausa (nasal tone of voice, abnormal **s**peech = hyponasality).
- Anterior nasal di**s**charge (bilateral)

B) Eustachian tube obstruction: CHL (conductive hearing loss) due to either: recurrent AOM or secretory OM.

C) Adenoid facies:

- Open dry mouth.
- Elevated upper lip.
- Promient central incisors.
- High arched palate.
- Receding lower Jaw.
- Narrow pinched anterior nares.
- Apathetic look.

Adenoid facies

2- Effects of recurrent infection:

A) Rhinitis and sinusitis.
B) Otitis media.
C) Pharyngitis, laryngitis and bronchitis.

3- General effects:

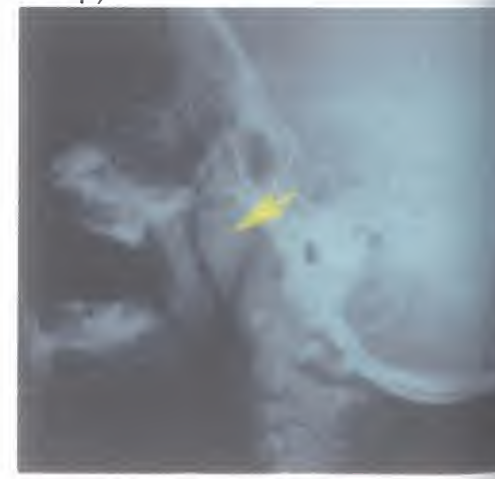
A) **S**chool retardation (due to deafness + interrupted sleep).
B) Nocturnal enure**s**is.
C) **S**leep apnea.

Signs:

1- Adenoid facies (Mentioned above).
2- Anterior rhinoscopy: narow pinched anterior nares with discharge.
3- Posterior rhinoscopy: postnasal discharge and the adenoid may be seen.

N.B. The adenoid is differntiated from a tumour by the presence of furrows (in the adenoid).

4- Oral cavity: open dry mouth.
5- Nasal endoscopy: can be done for co-operative children.



X-ray: Adenoid with narrow air column

Investigations:

Plain X-ray (lateral view on nasopharynx) shows narrow nasopharyngeal air column.

Treatment:

Adenoidectomy (± tonsillectomy if indicated)

Acute tonsillitis

Acute inflammation of lymphoid tonsillar tissues.

Causes:

- Low general resistance.
- May preceded by upper respiratory tract infection.

Causative organism: May start by viral infection then secondary bacterial infection.

The commonest organism is Beta-hemolytic streptococci.

Pathology:

1- Acute catarrhal tonsillitis:

Oedema and congestion of mucosa of tonsils

2- Acute follicular tonsillitis:

Pus in the crypts appears as yellowish spots on the surface.

3- Acute parenchymatous tonsillitis:

Hugely enlarged tonsils.

Clinical picture:

Symptoms:

General: Fever, headache, malaise and anorexia.

Local: Dysphagia, sore throat (± referred otalgia)
Hot potato voice.
Foetor oris.

Signs:

General : ↑ temperature and ↑ pulse.

Local:

- Tonsils show
.Congestion and oedema in catarrhal tonsilitis
.Yellowish spots in follicular tonsillitis
.Hugely enlargement in parenchymatous tonsilitis

Acute follicular tonsillitis

- Lymph nodes: enlarged, firm and tender (Jugulodiagastric LNs).

Investigations: in resistant cases

1- Throat swab for culture and sensitivity.
2- Complete blood picture → leucocytosis.
3- ↑ ESR (Erythrocyte sedementation rate).

Complications:

General:

-Rheumatic fever
-Glomerulonephritis

Local:

-Phyaryngeal suppurations as quinsy, parapharyngeal or retropharyngeal abscess.
-Chronicity.

Treatment:

General:

Complete bed rest + warm fluids.
Systemic antibiotics
Analgesic antipyretics.

Local:

Antiseptic mouth gargle.

Chronic tonsillitis

Chronic inflammation of lymphoid tissues of the tonsils.

Causes:

- Recurrent acute attacks.
- Persistence of the predisposing factors.

Clinical picture:

Symptoms:

General: manifestations of low-grade infection (?? septic focus).

Local:

- Recurrent acute attacks i.e. Dysphagia and sore throat.
- Otalgia (through Jackbson's nerve of glossopharyngeal).
- Foetor oris.
- Enlarged tonsils lead to:
  - a- Dysphagia.
  - b- Snoring and sleep apnea.
  - c- Hot potato voice.

Chronic tonsillitis

Signs:

Tonsils show:

- Congested anterior pillars.
- Size: Asymetrical enlargement.
- Shape: Irrigular.
- Squeezing: → Oozing pus.
- Probing → Indurated (firm).

Lymph nodes: Enlarged and firm.

Investigations:

1- ↑ ESR.

2- ↑ ASO (anti-stereptolysin o) titre (Normal =up to 200 tod's units)

Treatment:

Tonsillectomy

Septic Focus

Chronic toxaemia caused by chronic inflammations.

N.B. Septic focus is a controversial medical term without scientific evidence.

Examples of septic foci:

- Chronic tonsillitis.
- Chronic sinusitis.
- Dental caries.
- Chronic cholecystitis.

Clinical picture: *KLAM HLSE*

1- **K**idney: glomerulonephritis.
2- **L**ow grade fever.
3- **A**naemia.
4- **M**yalgia and arthralgia.
5- **H**eart: Rheumatic fever.
6- **L**ung: Bronchiectasis.
7- **S**kin: Dermatitis.
8- **E**ye: Iridocyclitis.

Septic focus

Diphtheria

Causative organism: Corynebacterium diphtheriae.
Mode of transmission: Droplet infection.
Age: 2 - 5 years
Incubation period: 2-5 days.
Types: 1- Pharyngeal (faucial) diphtheria: The commonest.
2- Laryngeal diphtheria: secondary to faucial diphtheria.
3- Nasal diphtheria: secondary to faucial diphtheria.

Pathology:
The organism remains in the pharynx producing powerful Exotoxins which has:
- Local effects: necrosis of tissues and pseudomembrane formation.
- Systemic effects: fixation to cardiac and neural tissues.

Clinical picture:

Symptoms:
General: Low grade fever, headache, malaise and anorexia.
Local: Severe dysphagia and sore throat.

Signs:
General: High temperature (not more than 38°).
Rapid pulse (disproprtionate to fever)
Toxaemia (pallor).

Local:
Pharynx shows pseudomembrane which is:
- Unilateral.
- Exceeds the limit of tonsil.
- Dirty greyish in colour.
- Offensive in odour.
- Deeply adherent.
- If removed → raw bleeding surface.
- It will reform rapidly.

Cervical lymph nodes: Hugely enlarged (Bull's neck).


Diphtheria

Investigations: Throat swab for:
- Direct smear: G +ve bacilli (Chinese letter appearance).
- Culture on Loffler's serum or Tellurite medium.

Differntial diagnosis of membranes of the pharynx:
Diseases causing membranes on the pharynx may be
1- Acute follicular tonsillitis
2- Diphtheria

	Acute follicular tonsillitis	Diphtheria
Onset	Acute	Insidious
Temperature	May be high	Low grade fever
Pulse	Proportionate to fever	Disproportionate to fever
Face	Flushed	Toxic (pale)
Toxaemia	No or mild	Severe
Pseudomembrane	Bilateral, Yellowish, limited to tonsils, and loose	Mentioned above
Throat swab	Beta-Hemolytic Streptococci	Corynebactrium diphtheriae

2- Vincent's angina: spirochetal infection with unilateral deep irregular ulcer.
3- Moniliasis: candida infection with milky whitish pseudomembrane.
4- Blood diseases: Infectious mononucleosis, Agranulocytosis and Leukaemia

Complications:

1- Cardiovascular:

Heart failure due to either toxic myocarditis or vagal neuritis.

2- Neurological:

a) Palatal paralysis (the 1st) → nasal regurgitation.

b) Ocular paralysis → Intrensic (loss of accomodation).
→ Extrensic (Diplopia and squint).

c) Laryngeal paralysis → Laryngeal obstruction (stridor).

d) Pharyngeal and oesophageal paralysis → Dysphagia.

e) Respiratory paralysis → Respiratory failure.

3- Respiratory:

a) Laryngeal obstruction by the pseudomembrane.

b) Respiratory infection: Bronchopneumonia, abscess.

c) Respiratory failure due to respiratory paralysis.

Treatment:

1- Hospitalization and isolation.

2- Antitoxic serum:

. Dose: 40.000-100.000 IU (units): IM or IV (double this dose in severe cases).

. Given once the diagnosis is suspected.

. Pre-test should be done (0.05 ml injected intradermal → erythematous wheel in +ve cases)

. In Hypersensitivity → use sheep's serum (not hoarse serum).
→ or Hyposensitization.
→ cortisone and antihistaminics.

3- Antibiotics: Penicillin or erythromycin.

4- Treatment of complications:

a) Laryngeal obstruction (stridor) → Tracheostomy.

b) Palatal, pharyngeal and oesophageal paralysis → Nasogastric tube.

c) Respiratory paralysis → Artificial respiration.

Prophylaxis:

1-Active Immunization: DPT (diphtheria, pertussus, and tetanus) given compulsory at 2, 4, 6 months, then booster dose at 18 months, 2nd booster dose at school age.

2-Passive Immunization: Small dose of antitoxic serum (for contacts).

Vincent's Angina *(Trench mouth)*

Causative organism:

Borrelia vincenti and Fusiform bacilli (spirochetes).

Predisposing factor: bad oral hygiene.

Clinical picture:

Symptoms:

General: Fever, headache, malaise and anorexia.

Local: Dysphagia and sore throat.

Signs:

General: High temperatue + rapid pulse.

Local:

- Pharynx shows pharyngeal ulceration with pseudomembrane (unilateral, with deep irregular ulcer).
- Cervical lymph nodes: enlarged, firm and tender.

Vincent's angina

Investigations: Swab for direct smear and culture.

Treatment:

General:
- Complete bed rest and plenty of warm fluids.
- Systemic antibiotics.
- Analgesic antipyretic.

Local:
- Antiseptic mouth wash.
- Management of dental problems.

Moniliasis

Moniliasis *(oral thrush, candidiasis)*

Causative organism: Candida albicans (Fungus).

Predisposing factors:

- Prolonged antibiotic therapy (super-infection).
- ↓ Immunity: Diabetes, AIDS, chronic diseases.

Clinical picture: no fever

Symptoms: Dysphagia and sore throat.

Signs: Milky whitish pseudomembrane.

Treatment:

- Stop the antibiotic therapy.
- Antifungal: Nystatin

Infectious mononucleosis *(Glandular fever, Kissing disease)*

Causative organism: Epstein Barr Virus (EBV).

Clinical picture:

- Febrile manifestations:

Fever, headache and malaise.

- Anginose manifestations:

Dysphagia and sore throat.
Oropharyngeal ulcerations, with pseudomembrane

- Glandular manifestations:

Generalized lymphadenopathy ± hepatosplenomegaly.

In addition:

1- Palatal petichiae.
2- Skin rash (if ampicillin is taken).

N.B. EBV infection is a common cause for chronic fatigue syndrome

EBV infection

Pharyngeal ulcerations + fever + Lymphadenopathy + skin rash + Hepatosplenomegaly

Investigations:

- Complete blood picture: Monocytosis.
- Serological tests: Paul-Bunnel test or monospot test and if negative, viral capsid antigen is requested

Treatment:

1- Complete bed rest, plenty of warm fluids.
2- Antibiotics but avoid ampicillin.
3- Analgesic antipyretics.
4- Cortisone: if there is airway obstruction.
5- Antiseptic mouth wash.

Leukaemia:

Neoplastic proliferation of leukocytic cells in bone marrow → Leucocytosis (Blast cells).

Clinical picture:

General:

- Recurrent infections (Blast cells) + bleeding tendency (↓ Platelets) + pallor (↓ RBCS).
- Generalized lymphadenopathy ± hepatosplenomegaly.

Local: - Dysphagia and sore throat.
- Oropharyngeal ulcers with pseudomembrane.

Agranulocytosis

Bone Marrow depression → ↓ granulocytes (neutrophils) i.e. leukopenia.

Cause:

May be Idiopathic, or due to antibiotic as chloramphenicol, cytotoxic drugs or Irradiation

Clinical Picture:

General: Recurrent infections.

Local: - Dysphagia and sore throat.
- Oropharyngeal ulcers with pseudomembrane, and little inflammatory reaction.

Acute non specific pharyngitis

Causative organism:

May be viral then secondary bacterial infection.

Clinical picture:

As acute tonsillitis but the infection and congestion are not limited to the tonsils (diffuse).

Treatment: as acute tonsillitis.

Acute non specific pharyngitis

Chronic non specific pharyngitis

Cause:

- Repeated acute attacks.
- Persistence of predisposing factors as smoking, pollution or gasro-esophageal reflux.

Clinical picture:

Symptoms:

Recurrent acute attacks with sense of dryness inbetween the attacks.

Signs:

Congested oedematous pharyngeal mucosa, may be hypertrophied or atrophied.

Treatment:

- Treatment of predisposing factors.
- Antibiotics and antiseptic mouth gargle.

Chronic specific pharyngitis

- Pharyngoscleroma:

2ry to and has the same stages of rhinoscleroma.

- T.B.:

With pulmonary T.B and ulcers of undermined edge.

- Syphilis:

1ry: chancre.

2ry: Mucous patches and snail track ulcers.

3ry: Gumma which ulcerates (punched out edge), may cause perforation of hard palate.

Syphilis: perforation of palate

ENT manifestations of AIDS

1- Aerodigestive moniliasis.
2- Kaposi's sarcoma.
3. Hairy leukoplakia.
4. Cervical lymphadenopathy.
5. Multiple parotid cysts.
6. Recurrent extensive infections.

AIDS: Oropharyngeal infections

Plummer - Vinson's syndrome (Paterson – Brown Kelly disease)

It is a chronic pharyngo-oesophagitis.

Cause:
Unknown but may be iron deficiency.

Pathology:
- Atrophy of mucosa.
- Submucosal fibrosis → annular stricture leads to web formation.

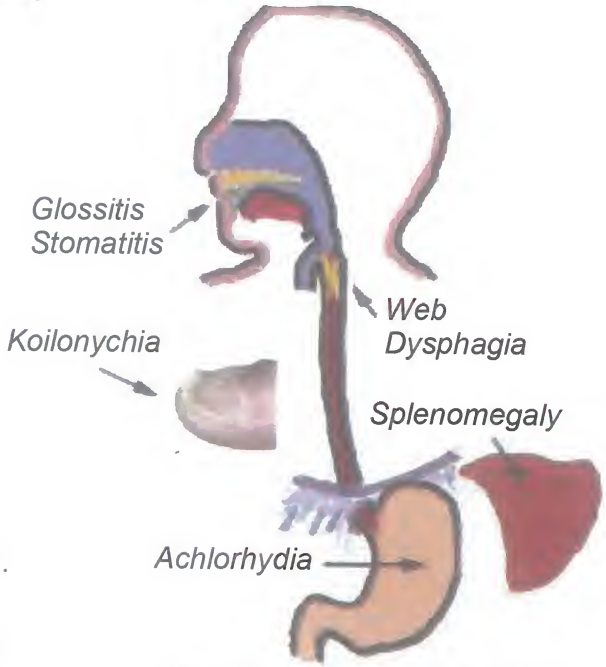
Sex:
It is more common in females.

Prognosis:
Precancerous (post-cricoid carcinoma).

Clinical picture:
1- Dysphagia:
Due to chronic pharyngo-oesophagitis + web.
2- Angular stomatitis and glossitis.
3- Achlorhydria: atrophy of gastric mucosa.
4- Pallor: due to anaemia.
5- Koilonychia (sponning of nails).
6- Splenomegaly.

Investigations:
- Complete blood picture:
Shows microcytic hypochromic anemia.
- X-ray with barium swallow:
Shows the web
- Oesophagoscopy:
Shows the web and taking a biopsy.

Treatment:
1- Correction of anaemia: iron.
2- Repeated dilatation.
3- Regular follow-up (as the condition is precancerous).



Plummer-Vinson's syndrome

X-ray with barium swallow: Web

Ulcers of the mouth and pharynx (Stomatitis)

Ulcer is the loss of continuity (interruption) of the surface epithelium.

Causes:

Tongue ulcers in AIDS

1- Traumatic:

a- Mechanical:

- Lacerating injury.
- Maldirected tooth.

b- Chemical: Corrosives.

c- Physical: Radiotherapy.

2- Inflammatory:

a. Acute:

I. Viral

- Herpes simplex (Herpes simplex virus).
- Herpes zoster (Herpes zoster virus)
- Herpangina (Coxsakie virus).
- AIDS: may lead to persistent ulcerations with moniliasis and gingivitis.

All characterized by: vesicles which rupture causing ulcers.

Herpes simplex affects anterior part and herpangina affects posterior part of the pharynx

Herpes zoster accompanied by vesicles and pain (neurotropic virus).

II. Bacterial:

- Severe pharyngitis and tonsillitis.
- Diphtheria.
- Vincent's angina.
- Cancrum oris: gangrene of the mouthfloor

III. Fungal: Moniliasis

Aphthous ulcers

b. Chronic:

- T.B.: The ulcer has undermined edge.
- Syphilis:

1ry: Chancre.

2ry: Snail track ulcer and mucous patches.

3ry: Ulcer with punched out edge.

c. Dyspeptic (aphthous ulcers): the exact cause is unkown

Multiple, small, painful, recurrent and yellowish ulcers associated with GIT troubles.

3- Neoplastic:

Malignant ulcer: raised everted edge, irrigular necrotic floor and indurated base.

4- Blood diseases:

a. Agranulocytosis: Oropharyngeal ulcers surrounded by little inflammatory reaction.

b. Leukaemia: Oropharyngeal ulcers with lymphadenophthy, pallor, bleeding tendency

c. Infectious mononucleosis: Oropharyngeal ulcers with lymphadenopathy, fever and palatal petichiae with +ve Paul-Bunnel test.

5- Skin diseases:

a. Pemphigus: autoimmune disease with bullae which rupture causing ulcers

Biopsy: intraepithelial lesion + acantholysis.

b. Pemphigoid: similar to pemphigus but the bullae are deep

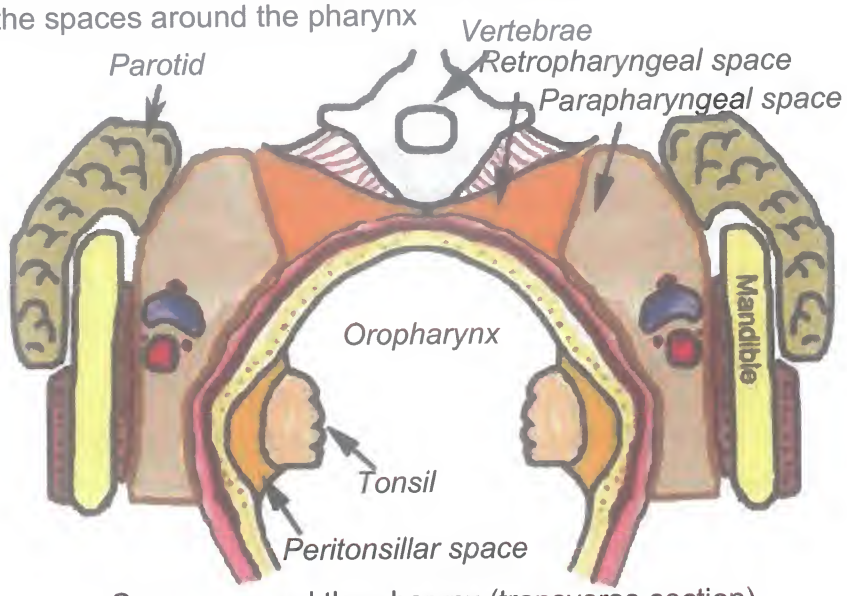
Biopsy: subepithelial lesion + no acantholysis.

c. Behcet's disease: Oropharyngeal ulcers.
Genital ulcers.
Iridocyclitis.

d. Drug eruptions: hypersesitivity reaction leading to vesicles that may ulcerates.

Pharyngeal Suppurations

Infections of the spaces around the pharynx



Spaces around the pharynx (transverse section)

Peritonsillar abscess (Quinsy)

Collection of pus in the peritonsillar space.

Peritonsillar space:
Present between capsule of the tonsil and its bed (superior constrictor) at its upper pole.

Cause:
Acute tonsillitis, infection in the crypta magna passes to the peritonsillar space.

Clinical picture:

Symptoms:

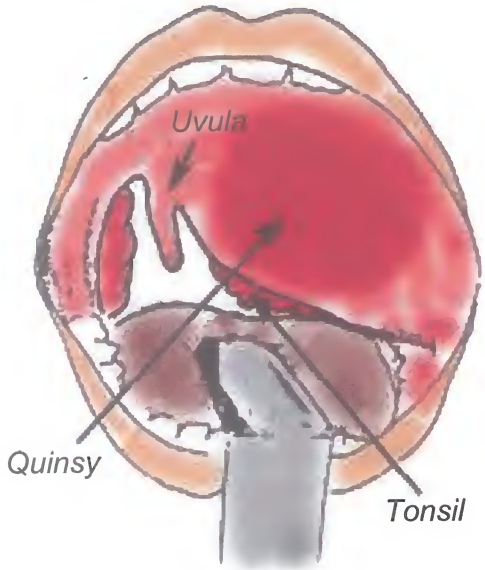
- General: Fever, headache, malaise and anorexia.
- Local:

1- Dysphagia and odynophagia with drippling of saliva
2- Neck pain behind the angle of mandible referred to the ear
3- Trismus: inability to open the Jaw.
4- Torticollis: flexion of neck to the diseased side.

Signs:

- General: High temperature and rapid pulse.
- Local:

1- Torticollis: pain causes spasm of neck muscles.
2- Trismus: pain causes spasm of pterygoids.
3- Oropharyngeal examination: swelling above and lateral to the tonsil pushing the tonsil downwards and medially and pushing the uvula to opposite side.
4- Jugulodigastric LNs: enlarged, firm and tender



Complications:
- Laryngeal oedema.
- Extension → Parapharyngeal abscess.
- Pyaemia and septicaemia.

Differntial Diagnosis:
- Unilateral tonsillar enlargement (as tumour e.g. lymphoma)
- Parapharyngeal swelling as carotid aneurysm (pulsations), parotid tumour or parapharyngeal abscess.

Treatment:
**** Before suppuration:*** It is treated as acute tonsillitis (i.e. medical treatment).
**** After Suppuration (pus formation):*** It needs drainage + medical treatment.
Suppuration is indicated by:
- *Hectic fever.*
- *Throbbing pain.*
- *Syringe aspiration shows pus.*

a. Incision and drainage:
- Under local or general anaesthesia.
- The knife must be gaurded to avoid deep injury.
- Site of the incision is better to be guided by a syringe aspiration, however it is usually in the most pointing point (If not seen → in the crypta magna).

b. Parenteral antibiotics and analgesic antipyretics.

c. Tonsillectomy:
It is done within one month after drainage (to avoid recurrence).

N.B. Sometimes quinsy-tonsillectomy is performed (Incision of abscess + tonsillectomy in one sitting) especially if the quinsy is posteriorly located (rare).

Parapharyngeal abscess
Collection of pus in the parapharyngeal space.

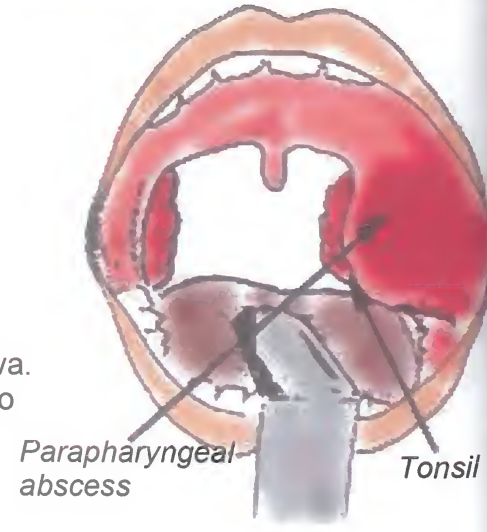

Parapharyngeal abscess

Parapharyngeal space:
It is located on either side of the pharynx.
It extends from the skull base to the hyoid bone.
- Laterally: ramus of mandible and parotid gland.
- Medially:
Anterior: buccopharyngeal fascia.
Posterior: prevertebral fascia.
- Contents:
Carotid sheath and its contents
Deep cervical LNs along IJV.
Sympathetic chain.
Last four cranial nerves.

Causes:
- Peritonsillar abscess.
- Acute tonsillitis.
- After tonsillectomy.

Clinical picture:
Symptoms:
- General: Fever, headach, malaise and anorexia.
- Local:

1- Dysphagia and odynophagia with drippling of saliva.
2- Neck pain behind the angle of mandible referred to the ear.
3- Neck swelling in the upper lateral part of neck.
4- Trismus: inability to open the Jaw.
5- Torticollis: flexion of neck to diseased side.



Signs:
- General: High temperature and rapid pulse.
- Local:

1- Torticollis: pain causes spasm of neck muscles.
2- Trismus: pain causes spasm of pterygoid muscles.
3- Internal swelling: swelling lateral to the tonsil pushing it medially.
4- External swelling: below and behind the angle of the mandible deep to the anterior border of sternomastoid.

Beck's triad = parapharyngeal abscess
Formed of: 1- Internal swelling (as above).
2- External swelling (as above).
3- Trismus.

Investigations: CT is diagnostic.

Complications:
- Laryngeal oedema.
- Thrombosis of IJV (internal jugular vein).
- Rupture of carotid artery.
- Pyaemia and septicaemia.

Differntial diagnosis:
From quinsy and other parapharyngeal swellings.

Treatment:
- Hospitalization with parenteral antibiotics + analgesic antipyretics.
- Incision and drainage:

Indication: pus formation (as before).
Site of incision: external incision along the anterior border of sternomastoid muscle.


Incision for parapharyngeal abscess

Retropharyngeal abscess:

a) Acute retropharyngeal abscess

Collection of pus in the retropharyngeal space.

Retropharyngeal space: Present posterior to the pharynx between buccopharyngeal fascia and prevertebral fascia to one side of the median raphe.

Cause: suppurations in lymph gland of Henle (which atrophies by the age of 5 years) due to infection in nose or pharynx (as sinusitis or tonsillitis).

Clinical picture:
Symptoms:
- General: Fever, headache, malaise and anorexia.
- Local:

1- Dysphagia and odynophagia with drippling of saliva.
2- Torticollis: flexion of neck forewards.
3- Nasal obstruction: collection of pus behind the nasopharynx
4- Laryngeal obstruction: collection of pus behind the hypopharynx.


Retopharyngeal abscess

Signs:

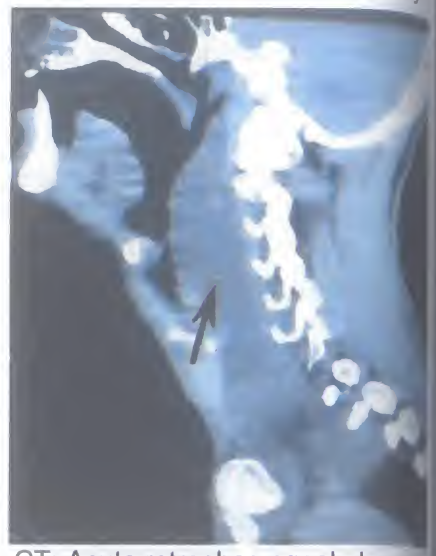
-General: High temperature and rapid pulse.

-Local:

1- Torticollis: pain causes spasm of prevertebral muscles.

2-Internal swelling: in the posterior pharyngeal wall to one side of the mid-line limited by the median raphe.

3-External swelling: enlarged, firm, tender deep cervical LNs.



CT: Acute retropharyngeal abscess

Investigations:

- X-ray lateral view neck: widening of prevertebral space with normal vertebrae.
- CT is diagnostic.

Treatment:

- Hospitalization with parentral antibiotics + analgesic antipyretics.
- Incision and drainage:

Indications → pus formtion (as before).

Under general anaesthesia.

Site of incision: Internal incision (in the pharynx), vertical over the abscess with the head low down (Trendlenberg's position), using suction apparatus and cuffed endotracheal intubation to avoid aspiration of pus.

b. Chronic retropharyngeal abscess

Synonym:

Cold abscess or ***Pott's disease of the spine.***

T.B. with collection of caseous material behind the prevertebral fascia.

CT: Cold abscess

Clinical picture:

General:

- T.B. toxaemia:
  - Loss of weight.
  - Loss of apetite.
  - Night fever.
  - Night sweating.
- Pulmonary T.B.: cough and hemoptysis.

Local:

- Dysphagia and odynophagia with drippling of saliva.
- Internal swelling: in the mid-line of posterior pharyngeal wall.
- External tenderness and rigidity: over the cervical spines (due to destroyed vertebrae).

Incision for chronic retropharyngeal a

Investigations:

- X-ray lateral view neck: widening of prevertebral space with destroyed vertebrae.
- CT is diagnostic.
- Investigations for T.B.: as chest X-ray and sputum analysis.

Treatment:
- Antituberculous treatment: as rifampicin.
- Incision and drainage:
Site: external incision along the posterior border of sternomastoid muscle.

Ludwig's Angina

Infection of the submandibular space, it is a severe cellulitis that may suppurate.

Submandibular space:
From the floor of mouth above to the deep fascia of the submandibular region below.

Cause:
- Dental infection: is the most common cause.
- Submandibular sialadenitis.

Clinical picture:

Symptoms:
- General: Fever, headache, malaise and anorexia.
- Local:
1- Dysphagia and odynophagia with drippling of saliva.
2- Neck pain: below the mandible.


Ludwig's angina

Signs:
- General: high temperature and rapid pulse.
- Local:
1-Internal swelling: in the floor of the mouth pushing the tongue above and backwards
2-External swelling: in the submandibular region,
First: it is indurated (hard, brawny),
Later on: becomes flactuant (on pus formation).

Complications:
1- Laryngeal oedema.
2- Pyaemia and septicaemia.
3- Airway obstruction by the tongue is common.


Incision for Ludwig's angina

Treatment:
- Hospitalization with parenteral antibiotics + analgesic antipyretics.
- Saving the airway: tracheostomy in severe stridor.
- Incision and drainage:
Indication → pus formation (flactuation).
Site of incision: transverse in the submandibular region.

Tumours of the Pharynx

Angiofibroma

It is a benign, highly vascular, locally aggressive tumour of the nasopharynx.

Age: Around 12 years with spontaneous regression at sexual maturity.

Sex: Exclusively in males.

Causes: Unknown but may be:
- Benign tumour of the periosteum of skull base.
- Hamartoma of vascular erectile tissue.
- Paraganglioma of maxillary artery.
- Hormonal disturbance causes hypertrophy of the periosteum of skull base (roof of nasopharynx).

Pathology

- Origin: Sphenopalatine foramen.
- Gross picture: Firm, lobulated, pinkish tumour, has no true capsule.
- Microscopic picture:

Angio = vascular spaces without musculosa.
Fibroma = collagen bundles and fibroblasts.
- Feeding vessel: mainly from maxillary artery.
- Behaviour: either spontaneous regression (rare) at sexual maturity or extension to the surrounding structures.

Clinical picture

General:

a- Pallor (due to anaemia from epistaxis).
b- Stunted growth.
c- Face shows:
- Proptosis.
- Facial swelling.
- Frog-face deformity.

Frog face deformity

Nasal:

Symptoms:
- Unilateral nasal obstruction.
- Intermittent epistaxis (severe).
- Unilateral nasal discharge.

Signs:
- Anterior rhinoscopy: unilateral nasal mass which bleeds on touch.
- Posterior rhinoscopy: lobulated pinkish mass.

N.B. Digital palpation is contraindicated as it leads to severe bleeding.

Aural:

ET obstruction leads to conductive hearing loss (secretory OM or recurrent AOM)

Differntial dignosis: *Other causes of unilateral nasal mass with unilateral obstruction*
Angiofibroma: *young boy with unilateral epistaxis.*
Anrochoaonal polyp and allergic fungal sinusitis: *any age or sex without epistaxis.*
Nasopharyngeal tumours: *usually in old age with sometimes epistaxis.*

N.B. Young <u>boy</u> with unilateral nasal obstruction and epistaxis = Angiofibroma until proved otherwise

Investigations:
- CT: to detect site, size and extension.
- Carotid **angiography**: to see feeding vessel, and to do preoperative embolization.
- MRI or MRA (MR Angiography): to detect intracranial extension.

N.B.: Biopsy is contraindicated → bleeding.

Treatment:
- ***Surgical:*** Surgical excision with preoperative embolizaiton (the standard treatment).
- ***Hormonal:*** Combination of oestrogen + testosterone →↑ fibrous tissue + ↓ vascularity (not used nowadays).
- ***Radiotherapy:*** Not done nowadays as it is carcinogenic except in recurrent cases with intracranial extension.

Nasopharyngeal carcinoma

Age: Old above 60 years.
Sex: More in males.
Race: More in Chinese.
Predisposing factors:
- Genetic: related to human leucocytic antigen (HLA).
- Epstein-Barr virus infection.
- Smoking.
- Irradiation.

Pathology:
- Gross picture: *Shape:* ulcer, cauliflower mass or nodular infeltrative.
  Site: fossa of Rosen Muller is the commonest site.
- Microscopic picture: squamous cell carcinoma is the commonest.
- Spread:

1) Direct: to the surrounding structures.
2) Lymphatic spread: retropharyngeal then to upper deep cervical LNs.

N.B. Nosopharynx is a midline structure, so bilateral nodal metastasis is common.

3) Blood spread: LLBB (Lung, Liver, Bone, and Brain).

- Prognosis: bad as the nasopharynx is a silent area, and midline.

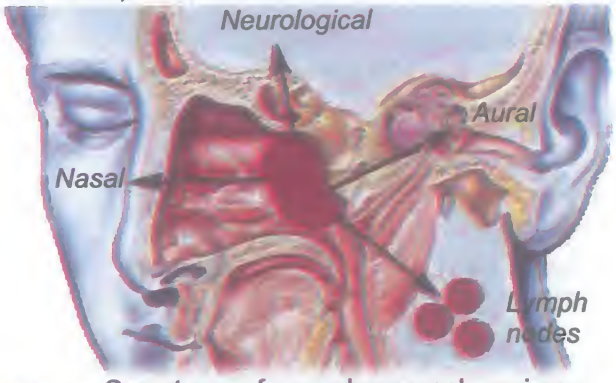
Clinical Picture:

Symptoms : *(ANNN)*

a. Symptoms of primary tumour :

Aural symptoms: *(A)*
- Unilateral secretory otitis media (CHL): due to obstruction of Eustachian tube
- Reffered otalgia through 9th nerve.

Nasal symptoms: *(N)*
Unilateral then bilateral nasal obstruction, discharge, and epistaxis.



Symptoms of nasopharyngeal carcinoma

b. Symptoms of local spread (neurological): *(N)*
Cranial nerve palsies in this order of frequency:
- 5th: unilateral facial pain, numbness then loss of sensation.
- Ocular(3rd , 4th , 6th):squint, diplopia and ophthalmoplegia.
- Lower 4 cranial nerves: (compression by retropharyngeal LNs at skull base)

c. Symptoms of lymphatic spread: Nodal *(N)*
Upper deep cervical LNs may be felt, incidence of lymphatic spread is 70%.

d. Symptoms of blood spread:
Lung, liver, bone, and brain (LLBB).

Signs:

a. Local examination: Nasopharyngeal examination: with nasal endoscopy
Neck examination: for lymph nodes

b. General examination: to exclude distant metastasis.

> ***Trotter's traid (diagnostic for nasopharyngeal carcinoma):***
> ***1) Unilateral facial pain (trigeminal nerve).***
> ***2) Unilateral palatal immobility (fixation of palate).***
> ***3) Unilateral conductive deafness (ET obstruction).***

Investigations:
- CT: to detect site, size and extensions of the tumour, and retropharyngeal LNs enlargement (which is not clinically palpable).
- MRI: to detect intracranial extension.
- Biopsy by nasal endoscopy (under local anaesthesia).
- Metastatic work up.

Treatment:
- Radiotherapy: to 1ry tumour in the nasopharynx and to neck (for LNs) in both sides.
- Surgery: has no place as a primary treatment, it is done only (radical neck dissection) for persistent or recurrent LNs (after failure of radiotherapy to control the nodes).

Malignant tumours of Oropharynx

Age: carcinoma in old age above 60 years and sarcoma in young age.
Sex: more in males.
Predisposing factors:
- Somking.
- Alcohol.
- Irradiation.

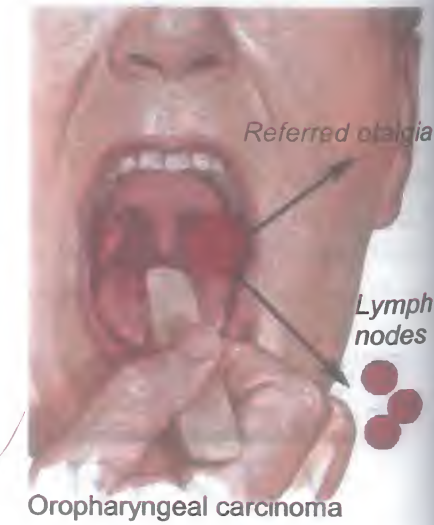
Pathology:
- Gross picture: *Shape:* Ulcer (carcinoma), Mass (lymphoma), or nodular infiltrative
  Site: The commonest site is the tonsil and the tongue base.
- Microscopic: Squamous cell carcinoma or lymphoma.
- Spread: Direct, Lymphatic, and Blood

N.B. The specific lymph nodes for tonsil and tongue base are the jugulodiagastric LNs.
- Prognosis: according to the stage of the tumour.

Clinical Picture:
Symptoms:
a. Symptoms of primary tumour:
-Dysphagia.
- Reffered otalgia through 9th nerve.
b. Symptoms of local spread: Trismus (pterygoids).
c. Symptoms of lymphatic spread: Neck swelling.
d. Symptoms of blood spread: LLBB

Signs:
a. Local examination:
- Oropharyngeal examination: Ulcer or mass.
- Neck examination: For lymph nodes metastasis.

b. General examination: to exclude distant metastasis.



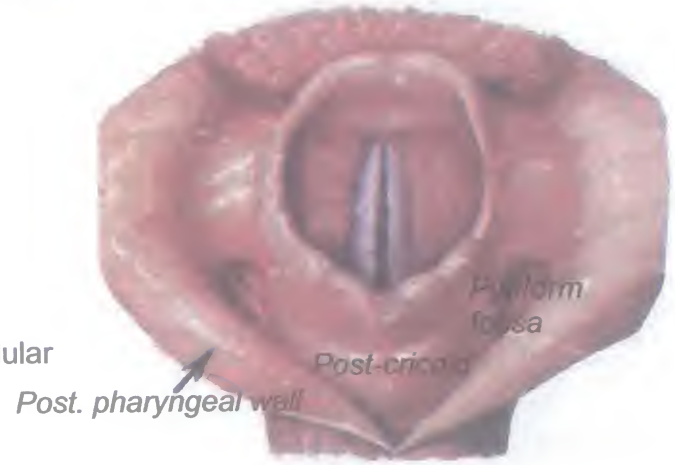
Oropharyngeal carcinoma

Investigations:
- CT: to detect site, size and extension and lymph nodes (LNs) metastasis.
- MRI.
- Biopsy: from the tumour itself.
- Metastatic work up.

Treatment:
-***Radiotherapy:*** To 1ry tumour and LNs in the neck is the treatment of choice.
-***Surgery:*** **Com**bined neck dissection, **Mand**ibulectomy and **O**ropharyngeal resection)

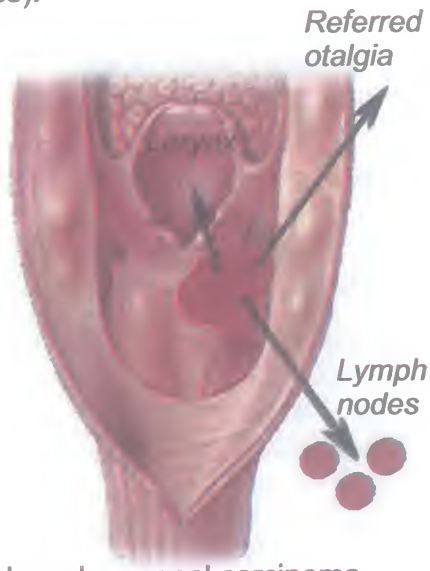
Malignant tumours of Hypopharynx

Age: Old above 60 years.
Sex: More in males.
Predisposing factors:
-Plummer-Vinson syndrome
-Smoking.
-Irradiation.
-Alcohol.



Pathology:
- Gross picture:
Shape: ulcer, cauliflower mass or nodular infeltrative.
Sites: Pyriform fossa (50%).
Post-cricoid (40%).
Posterior pharyngeal wall (10%).
- Microscopic picture: Squamous cell carcinoma
- Spread:
1- Direct spread: to the surrounding structures.
2- Lymphatic spread:
To upper and lower deep cervical lymph nodes.
Post-cricoid area is a midline structure; gives bilateral nodal metastasis.
Postcricoid area also gives superior mediastinal LNs (bad prognosis).
Pyriform fossa is one of the silent areas (rich in lymphatics).
3- Blood spread: LLBB.
- Prognosis: Bad and the 5 year survival rate is 30%.

Clinical picture:
Symptoms:
a. Symptoms of primary tumour:
- Dysphagia: first for solid then for solids and fluids.
N.B.: Pyriform fossa is one of the silent areas.
- Reffered otalgia through 10th nerve (vagus).
- Chocking.
- Regurgitation.
- Loss of weight.
b. Symptoms of local spread: to larynx
- Hoarseness of voice.
- Stridor.
c. Symptoms of lymphatic spread:
Neck swelling: LNs. Enlargement.
d. Symptoms of blood spread: LLBB.



Hypopharyngeal carcinoma

Sings:

Local examination:

- Examination of hypopharynx (behind the larynx): by Indirect or flexible laryngoscopy to see either the tumour mass or froth collection in pyriform fossa or post-cricoid area.
- Examination of the neck:

a) Moure's sign: Friction of the cricoid cartilage to vertebrae showing absent click in postcricoid carcinoma (see clinical ENT).
b) Masses in the neck: LNs enlargement.

General examination:

1) Cachexia (the patient is underweight due to dysphagia).
2) Pallor and anaemia: Plummer-Vinson syndrome may be the cause.
3) Exclude distant metastasis.

Investigations:

- X-ray lateral view neck: widening of prevertebral space in postcricoid carcinoma.
- Barium swallow: to see the lower limit of the tumour.
- CT neck: To see site, size, and extension, and LNs metastasis.
- Biopsy by hypopharyngoscopy (under general anaesthesia).
- Metastatic work up.

Treatment:

Curative treatment: Combined surgery and radiotherapy.

- For primary tumour:

Total pharyngolaryngectomy ± oesophagectomy with postoperative radiotherapy.

- For lymph nodes:

Radical neck dissection if there is LNs enlargement.

Reconstruction after total Pharyngolaryngectomy: by one of the following methods

1. Stomach pull - up (the best).
2. Free radial forearm flap.

Palliative treatment:

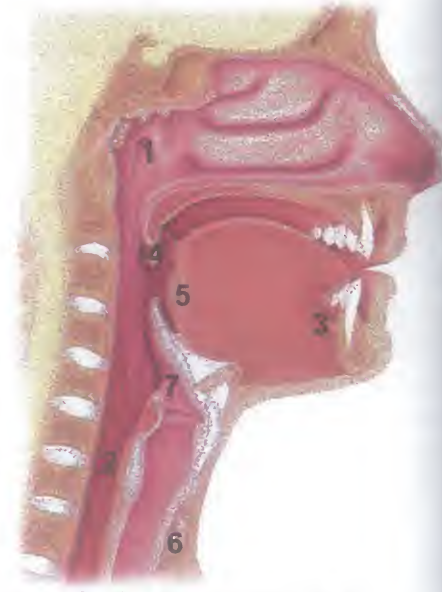
For extensive tumours fixed to vertebral column and/or with distant metastasis.

1. Radiotherapy.
2. Chemotherapy.
3. Surgery as tracheostomy for stidor and gastrostomy for dysphagia.
4. Pain killers (analgesics).
5- Adequate feeding.

Silent areas in the head and neck

Areas that may lead to lymph node metastasis (Neck swelling) before giving symptoms related to the affected area (areas rich in lymphatics).

1- Fossa of Rosen-Muller (Nasopharynx).
2- Pyriform Fossa (Hypopharynx).
3- Floor of mouth.
4- Tonsil.
5- Tongue base.
6- Thyroid.
7- Supraglottic area of larynx.



Silent areas in the head and neck

The occult primary

The patient presented with a neck mass i.e. lump (lymph node enlargement), while the primary tumour (which cause lymphatic metastasis) is unknown.

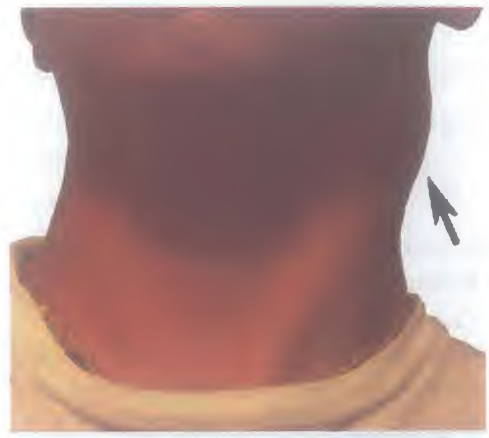
The primary may be:

a) In the head and neck:

One of the silent areas (see before)

b) Below the level of the clavicle:

1. **Bronchus.**
2. **Breast.**
3. **Bowel.**



Unilateral neck mass (lymph node)

Management of occult primary:

It means discovery of the primary tumour that cause the lymph node metastasis, it includes:

A) History:

- Onset, course, and duration of the neck mass.
- Symptoms of head and neck diseases.
- Symptoms of chest diseases.
- Symptoms of bowel diseases.

B) Examination:

- Examination of the neck mass.
- Full head and neck examination.
- Chest examination.
- Abdominal examination.

C) Investigations:

1. Radiological:

- X-ray : head, neck, and chest.
- CT: from skull base to chest.
- Barium swallow, and barium meal.
- Thyroid scan.

2. Hematological: complete blood picture, ESR....

3. Pathological:

FNAB (Fine Needle Aspiration Biopsy) as open biopsy is not preferred as it may lead to spillage of malignant cells.

4. Endoscopic:

Panendoscopy (all types of ENT endoscopies) and biopsy from any suspicious area.

Avoid removing the neck mass before discovery of the primary, this is because:

1. Spillage of malignant cells.
2. Your incision well interfer with the incision of radical neck dissection (RND) later on.
3. If the mass (LNs) proved to be squamous cell carcinoma, it does not indicate the site of the primary (as most of the primary tumour of head and neck are squamous cell carcinoma).
4. False sense of security for the patient.

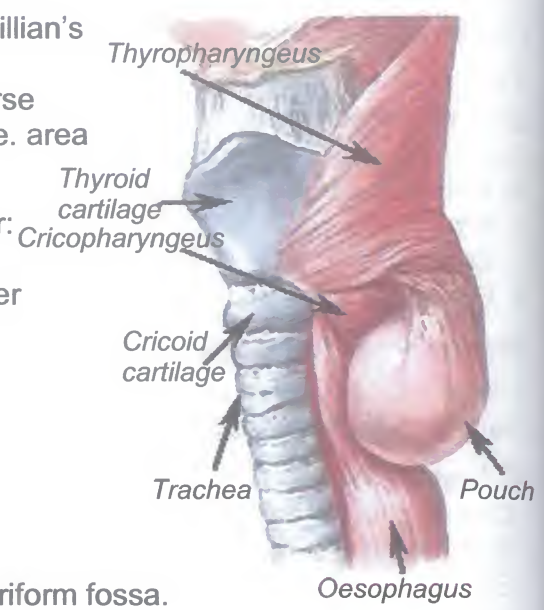
Fine needle aspiration

Pharyngeal Pouch

Synonym: ***Zenker's diverticulum***.

It is a herniation of pharyngeal mucosa through Killian's dehisence.

Killian's dehisence: the space between transverse cricopharynseus and oblique thyropharyngeus (i.e. area deficient of muscle coat).



Causes: ↑ Intrapharyngeal pressure due to either:
- Spasm of crico-pharyngeal sphincter.
- Failure of relaxation of crico-pharyngeal sphincter

Clinical picture: It is a rare disease of elderly

Symptoms:
- Dysphagia.
- Regurgitation of undigested food.
- Neck swelling: on left side of the neck

Signs:

1- Hypopharynx:

Indirect or flexible laryngoscopy shows froth in pyriform fossa.

2- Neck:

Swelling on the left side of the neck under sternomastoid which is:
- Cystic.
- Compressible.
- Increasing with coughing and straining.

X-ray with barium swallow: Pouch

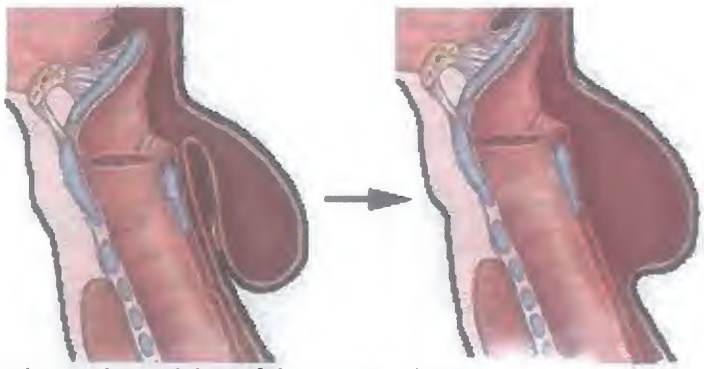
Investigations:

1- Barium swallow: Retort - shaped swelling.

2- Hypopharyngoscopy: froth or undigested food in pyriform fossa, the opening of the pouch may be seen.

Treatment:

1- Endoscopic treatment:
- Repeated dilatation of cricopharyngeal sphincter.
- Endoscopic excision of the septum between pouch and oesophagus by diathermy or laser.



Endoscopic excision of the septum between pouch and oesophagus

2- Surgical treatment:
- Cricopharyngeal myotomy: to open the sphincter.
- Excision of the pouch (diverticulectomy) with crico-pharyngeal myotomy to prevent recurrence.

Snoring and sleep apnea

Snoring: Abnormal noise produced during sleep due to vibration of redundant oropharyngal and/or hypopharyngeal tissues.
Apnea: Cessation of breathing for at least 10 seconds.


Snoring is an annoying sound to your partner

Types of Apnea:
1- Central:
Respiratory center depression.
2- Peripheral (obstructive):
Upper airway obstruction
3- Mixed: both.

Apnea index: Number of apneas/hour sleep.
Sleep apnea syndrome: More than 30 apneas/7 hour sleep.

Causes of Obstructive sleep apnea (OSA):

(1) Nasal obstruction:
a. Bilateral nasal polypi.
b. Nasal packing.
c. Deviated septum (S shape).
d. Bilateral enlarged turbinates.

(2) Pharyngeal obstruction:
a. Large adenoid.
b. Tonsillar enlargement.
c. Large soft palate and uvula
d. Macroglossia (large tongue).
e. Micrognathia (small mandible).
f. Pharyngeal tumour.

Causes of snoring and OSA

Clinical picture:

Symptoms:

(1) Snoring, apnea and arousals:
- Increased when the patient lies on his back
- Arousals caused by apnea → increase CO_2 → stimulation of respiratory center → arousal.

(2) Hypersomnia by day.
(3) Morning headache and loss of concentration.
(4) Nocturnal eneuresis, hypertension and impotence.
N.B.: Severity of apnea increased by obesity, alcohol and sedatives.
Not every snorer has sleep apnea but it is present only in severe cases.

Hypersomnia by day: during work

Signs:

General: Obesity, short neck and hypertension may be present.

Local: Nasal, nasopharyngeal, oropharyngeal and hypopharyngeal examination to detect the cause of obstruction.

Investigations:

(1) Cephalometic study:
X-ray and CT to detect site of obstruction.

(2) Flexible nasopharyngoscopy:
The nasopharyngoscope is introduced from the nose to the pharynx and the patient is asked to do suction of the airway after closure of nose and mouth, this is to detect the most collapsable area (It is called Muller's maneuver i.e against valsalva).

(3) Rhinomanometry: to detect nasal resistance.

(4) Polysomnography:
The patient stays a night in sleep lab. for measurement of the following: ECG, EEG, EMG, pulse oximetry, nasal and oral airflow, chest and abdominal movements. It differentiates between obstructive and central apnea.

Complications:
1- Pulmonary hypertension.
2- Systemic hypertension.
3- Cor-pulmonale and heart failure.
4- Personality changes.
5- Familial troubles (divorce).
6- Sudden death.


CPAP

Treatment:

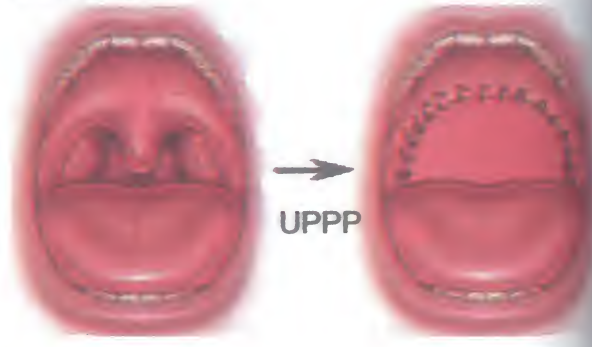
I- Medical:
1. Reduction of body weight.
2. Avoid alcohol and sedatives.
3. Protriptyline: antidepressant.
4. Nasovent: to open the nasal valve.
5. Tongue retaining device.
6. CPAP (Continuous Positive Airway Pressure).

II- Surgical:
One of the following operations according to the site of obstruction.

1. Adenotonsillectomy: in adenotonsillar hypertrophy.

2. Nasal surgery: as SMR, turbinectomy or polypectomy.

3. Palatal surgery:
- UPPP (Uveopalatopharygoplasty): Reduction of the size of the uveola, soft palate and removal of the tonsils.
- LAUP (Laser assissted uveopalatoplasty): reduction of the size of the palate and uvula by Laser.



4. Midline glossectomy: in macroglossia.

5. Mandibular advancement: in micrognathia.

6. Tracheostomy: in severe cases with no other options.

N.B. Obesity is the commonest cause of snoring in adults as it causes enlargement of soft palate and uvula, while the commonest in children is adenotonsillar hypertrophy.

Foetor oris (Halitosis)

Bad mouth odour.

Foetor oris leads to shyness

Causes:

1- Oral:

- Dental caries: The commonest cause.
- Bad oral hygiene.
- Oral ulcerations as vincent's angina.
- Ulcerating malignant tumours.

2- Nasal:

- FB in the nose.
- Sinusitis of dental origin.
- Atrophic rhinitis.
- Ulcerating malignant tumours.

3- Pharyngeal:

- Acute, chronic tonsillitis and suppuration.
- Pharyngeal ulcerations as diphtheria.
- Pharyngeal pouch (contains undigested food).
- Ulcerating malignant tumour.

4- Oesophageal:

Gastro-oesophageal reflux disease (GERD).

5- Pulmonary:

- Bronchiectasis.
- Lung abscess.

6- Metabolic:

- Diabetic → Acetone like odour.
- Uraemic → Urineferous odour.
- Hepatic → Sweety odour.

7- Physiological:

Hungery and Fasting.

8- Psychological:

Non existing odour.

Trismus

Inability to open the jaw.

TMJ and muscles of mastication

Causes:

Either defect in the muscles of mastication or tempro-mandibular Joint (TMJ)

1- Muscular lesions:

a- Traumatic: Maxillo-facial trauma and tonsillectomy → spasm of masticatory muscles.

b- Inflammatory: as dental infection (peri-apical abscess in last molar), quinsy and parapharyngeal abscess → spasm of masticatory muscles.

c- Neoplastic: Posterior extension of cancer maxilla → infeltration of masticatory muscles.

d- Miscellaneus: Tetanus (exotoxin), tetany (calcium defeciency), and strychnine poisoning → spasm.

2- TMJ lesions: TMJ ankylosis may be due to:

- Traumatic: fracture mandibular condyle.
- Inflammatory: TMJ arthritis.

3- Hysterical.

Tonsillectomy

Indications:

1. **Recurrent acute attack** (more than 3 times/year).
2. One attack of quinsy (Once quinsy always quinsy, it is an old concept, recently in recurrent quinsy)
3. Chronic tonsillitis causing:
- **Snoring and sleep apnea** due to hypertrophy (the only absolute indication).
- Dysphagia due to hypertrophy.
- Persistent enlarged jugulodiagstric lymph nodes (may be TB)
- Septic focus.
- Rheumatic fever or glomerulonephritis.
4. Diphtheria carrier: resistant to medical treatment.
5. Tumour of tonsil: either
- Benign: papilloma.
- Malignant: carcinoma or lymphoma.

Tonsillectomy

Contraindications:

A. Absolute:

Bleeding disorders as haemophilia, purpura, or leukaemia

B. Relative: should be relieved before operation

1. Acute tonsillitis.
2. Acute upper respiratory tract infection as common cold.
3. Active systemic disease (as diabetes).
4. Active rheumatic fever (↑ ESR).
5. Menstruation: during menses.

Pre-operative preparation:

1. History:

- To be sure from indication (e.g. number of attacks/year).
- To exclude contraindications (e.g. fever, bleeding diorders).

2. Examination:

- To be sure from indication (e.g. signs of chronic tonsillitis).
- To exclude contraindications (e.g. acute inflammation).

3. Investigations:

- ESR (first hour = 5-10).
- Blood picture to exclude anaemia (RBCs), leukaemia (WBCs) or purpura (platelets).
- Co-agulation profile:
  - Bleeding time.
  - Clotting time.
  - Prothrombine time (12sec.) and concentration (100%).
  - Partial thromboplastin time.

4. Pre-operative instructions: Fasting for at least 6 hours.

5. Pre-operative medications:

- Antibiotics: to prevent infections.
- Atropine: to decrease secretions.
- Aspirin: should be avoided 10 days before the operation to avoid bleeding.

Technique:

- It is performed under general anaesthesia (GA).
- Many techniques have been described, but the most routinely used is the dissection

a. ***Dissection*** (the standard method).
b. ***Guillotine:*** not used nowadays due to high incidence of haemorrage, injury and respiratory complications.
b. ***Laser:*** dissection or cryptolysis.
c. ***Coblation tonsillectomy:*** radiofrequency ablation of tonsillar tissues.
d. ***Cryosurgery:*** in bleeding disorders.

Dissection method

1. Supine position with maintaining the mouth open by Davis-Boyle mouth gag.
2. Incision of the pillars (mucosa only).
3. Dissection of the tonsils and ligation of the blood vessels.

Post-tonsillectomy position

Post-operative Care:

1- Position: the patient lying on his side with the head down to prevent aspiration of blood, vomitus, or falling of tongue backwards.

2- Extubation: it is done after return of cough reflex (as cough extrudes the secretions).

3- Observation of respiration: - Colour of lips for cyanosis.
- Noise of respiration for stridor (airway obstruction).

4- Observation of bleeding: indicated by - Frequent swallowing of blood.
- Weak rapid pulse and hypotension.

5- Antibiotics: To prevent wound infection.

6- Analgesics: To decrease pain, but avoid aspirin and non-steroidal anti-inflammatory.

7- Feeding: Iced soft or semisolid foods (to ↓ bleeding)

Complications:

[1] Haemorrhage: It may be

a. Primary: during the operation. It is due to inadequate preparation as bleeding disorders or acute infections.

Treatment: ligation or diathermy of vessels or fresh blood transfusion in bleeding disorders.

b. Reactionary: within 24 hours. It is due to elevation of blood pressure (normalization) after recovery from anaesthesia.

Treatment: In mild cases: local haemostatic pressure.
In severe cases: reanaesthesia and ligation or diathermy of the vessels.

c. Secondary: within 10 days. It is due to wound infection that cause vascular necrosis.

Treatment: Antibiotics and sedation, Reanaesthesia (in severe cases) but ligation is impossible as the tissue is friable so we insert pack of gauze in the tonsillar bed then stitch the anterior to posterior pillars over it (ligation of external carotid can be done).

[2] Respiratory: either

a. Respiratory obstruction by:

- Laryngeal spasm after extubation due to inhalation of blood or vomitus:

Treatment: by suction of blood and O_2 inhalation.

- Falling of tongue backwards:

Treatment: by pulling the tongue and insertion of plastic oral airway.

b. Respiratory infection: Bronchitis, pneumonia, or lung abscess.

[3] Anaesthetic complications: Anaphylactic shock.
Apnea (succinyl apnea).
Arrest (cardiac arrest).

[4] Incomplete removal:

Causes haemorrhage or compensatory hypertrophy of remnants.

[5] Injury: To palate, tongue or teeth.

[6] Infection:

- Wound infection causing secondary haemorrhage.
- Respiratory infection.
- Parapharyngeal abscess.

Adenoidectomy

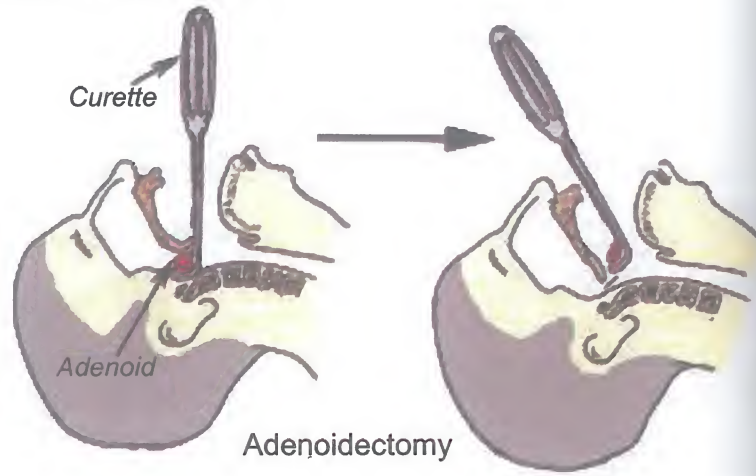
Indications:

1) Hypertrophy causing:

- Nasal obstruction causing snoring and sleep apnea.
- Eustachian tube obstruction with conductive hearin loss.
- Adenoid facies.

2) Recurrent infection:

- Rhinitis and sinusitis.
- Otitis media.
- Pharyngitis, laryngitis or bronchitis.



Adenoidectomy

Contraindications:

As Tonsillectomy, but it is contraindicated also, in cases of **cleft palate** (even after repair), to avoid nasopharyngeal (velopharyngeal) incompetence.

Pre-operative preparation and post-operative care: as Tonsillectomy.

Technique:

- Under general anaesthesia.
-The patient lying supine on the back with the head slightly flexed (in tonsillectomy → extended).
- The adenoid is shaved with curette.
- Pack is inserted for 10 minutes.

Complications:

As tonsillectomy + injury to prevertebral muscles and Eustachian tube opening and also may lead to velopharyngeal incompetence.

N.B.: *all types of post-denoidectomy bleeding are treated by posterior nasal pack.*

Adenotonsillectomy

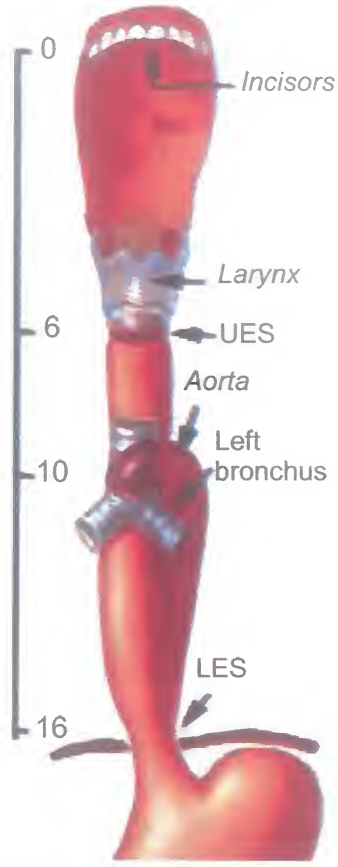
Adenoidectomy is performed first with the head slightly flexed then tonsillectomy is performed after head extension (this is to allow time for haemostasis after packing the nasopharynx and during this time tonsillectomy is done then remove the pack).

Oesophagus

Anatomy

- It is a fibromuscular tube 25cm (10 inches) long in adults.
- It extends from the level of cricoid cartilage (C6) to the cardiac sphincter (T12).
- It has 3 constrictions:

1- Upper oesophageal sphincter [UES] (crico-pharyngeus): 6 inches (15 cm) from central incisors.
2- At the level of crossing of Aortic arch and left main bronchus: 10 inches (25cm) from central incisors.
3- Lower oesophageal sphincter [LES] (cardia): 16 inches (40cm) from central incisors.



Congenital diseases

Atresia.
Tracheo-oesophageal fistula.

Traumatic diseases

Foreign body

Type of FB and Type of the patients:
- Coins in children.
- Fish bone or meat bone in adults.
- Denture in old age.
- Razors or pins in prisoners and mentally retarded patients.

Site of impaction:
- Below the cricopharyngeus [UES] at the upper end of the oesophagus.
- At the the level of other constrictions.

Clinical picture:
- Dysphagia.
- Regurgitation.
- Pain.

N.B.: *A coin may remain latent for weeks or even months.*

Investigations:
- Plain X-ray: to show radio-opaque FB.
- Barium swallow: to show radiolucent FB.
- Oesophagoscopy.

Treatment:
Removal by oesophagoscopy


X-ray: Coin in hypopharynx

Corrosive oesophagitis

Swallowing of corrosive materials is usually accidental in children and suicidal in adults.
It may be either:
- Alkalies: as Caustic potash
- Acids: rare.

Management: Passes into 2 stages

1- Acute stage:

a. Local: Dysphagia and pain: ulcerations in mouth, pharynx and oesophagus.
Stridor: laryngeal oedema.

b. General: Shock either neurogenic due to pain or hypovolaemic due to dysphagia.

Treatment:
1- Immediate demulcent: milk and egg white.
2- Antibiotics.
3- Steroids: to prevent oedema (early) and fibrosis (late).
4- A rubber nasogastric tube may be used in the 1st few days to maintain a patent lumen.


X-ray with barium swallow: Stric

2- Chronic stage:
Lead to **stricture** oesophagus due to fibrosis.
- Dysphagia: first for solids then for solids and fluids.
- Regurgitation.
- Loss of weight.

Investigations:
- Barium swallow: shows site, length and degree of stricture.
- Oesophagoscopy: shows white fibrous concentric stricture.

Treatment:
1- Permeable stricture: Repeated dilatation using elastic dilator (bougie) through the oesophagoscope.
2- Impermeable stricture:
- Gastrostomy: temporary treatment.
- Resection anastomosis: permanent treatment.


X-ray with barium swallow: Cancer oeso

Tumours
Benign: Fibroma and Lieomyoma.
Malignant: Carcinoma.

Cancer oesophagus
Age: more in old age.
Sex: more in males
Predisposing factor:
- Smoking.
- Alcohol.
- Irradiation.
- Plummer-Vinson syndrome.

Pathology:
- Gross picture:
Shape: Ulcer, cauliflower or nodular infiltrative.
Site: Lower 1/3 (commonest).
Middle 1/3.
Upper 1/3.
- Microscopic picture: squamous cell carcinoma or adenocarcinoma.
- Spread: Direct, Lymphatic and Blood.
- Prognosis: Bad.

Clinical Picture:
- Dysphagia: progressive, starts for solids then solids and fluids.
- Loss of weight.
- Regurgitation.
- Pain
- Hematemesis and melena.

Investigations:
- Barium swallow: Rat-tail appearance with irregular filling defects.
- Oesophagoscopy: and take a biopsy.
- Metastatic work-up.

Treatment:

- **Curative:** in operable cases.

a. Surgical: Excision and re-anastomosis.
b. Radiotherapy.

- **Palliative:**

a. Painkillers.
b. Surgical: gastrostomy or colon by pass.
c. Radiotherapy: by Souttar's tube containing radioactive material.
d. Chemotherapy.
e. Adequate nutrition.

N.B. Causes of stricture oesophagus:

1. Congenital atresia.
2. Traumatic: Corrosive.
3. Inflammatory: Plummer-Vinson's syndrome.
4. Neoplastic:

Benign → Leiomyoma.
Malignant → Carcinoma.

5. Miscellaneous: Scleroderma.

Achalasia of the cardia

Dilatation of lower $^{2}/_{3}$ of the oesophagus.

Cause: Defect in Aurbach's plexus leads to either failure of relaxation or spasm of cardiac (LES) sphincter.

Clinical picture: More common in middle age neurotic females.

1- Dysphagia:
- More for fluids than for solids.
- Intermittent after nervous shock.

2- Regurgitation of undigested food.
3- No loss of weight (intermittent and solids pass by gravity).

Investigations:

- Barium swallow: dilated lower $^{2}/_{3}$ of oesophagus with smooth tapering lower end.
- Oesophagoscopy.

Treatment:

- **Medical:**
- Sedatives (neurotic patients): as diazepam.
- Muscle relaxant (for cardiospasm).

- **Surgical:**
- Endoscopic dilatation of the cardiac sphincter.
- Cardiomyotomy (Heller's operation).
- Cardioplasty (surgical dilatation).

X-ray with barium swallow: Achalasia

Globus hystericus (Globus pharyngis)

Sensation of a lump in the throat with no organic cause.

Aetiology:

Unknown but may be psychological caused by cancer phobia.

Clinical picture: sensation of a lump i.e mass (usually in mid-line) during swallowing of saliva (absent in swallowing of food).

Investigations: barium swallow and oesophagoscopy show no abnormality.

Treatment: psychological reassurance.

Gastro-esophageal reflux disease (GERD)

Reflux of gastric contents into the oesophagus, pharynx and larynx

Causes: due to failure of lower oesophageal (cardiac) sphincter (LES).

1. Decreased LES tone due to hiatus hernia, smoking, alcohol, and fatty food.
2. Increased gastric secretion due to stress, caffeine, and spicy food.

Clinical picture

Oesophageal symptoms: heart burn and chest pain.

Pharyngeal symptoms: recurrent pharyngitis with Helicobacter pylori.

Laryngeal symptoms: recurrent laryngitis leading to hoarseness and chocking.

N.B. It is a predisposing factor for cancer esophagus, hypopharynx, and larynx.

Investigations

- Barium swallow: may show hiatus hernia
- Oesophagoscopy: lower oesophageal ulceration.
- 24-hour PH monitoring: PH<4 is diagnostic
- Oesophageal manometry: measures the intra-luminal pressure.

GERD

Treatment

- Medical:

- Avoid eating 3 hours before the bedtime.
- Avoid stress, alcohol, smoking, caffeine, fatty and spicy food.
- Elevation of head of bed.
- Proton pump inhibitors and H_2 antagonists.

- Surgical:

Fundoplication for treatment of hiatus hernia.

Oesophagoscopy

Direct visualization of the oesophagus using esophagoscope under general anaesthesia

(N.B. flexible oesophagoscopy is done under sedation by gastroenterologist).

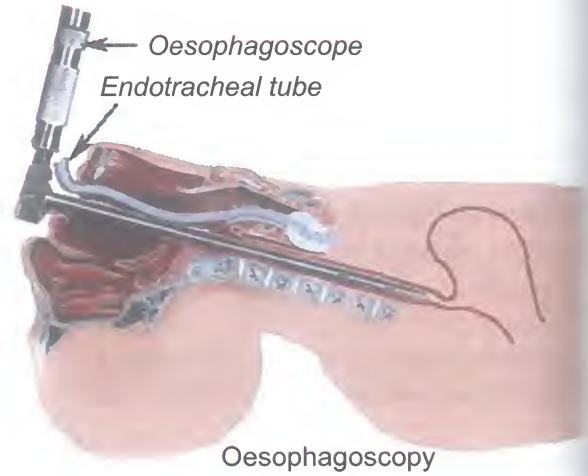
Indications:

- Diagnostic:

To detect the cause of dysphagia.
To take a biopsy from a tumour

- Therapeutic:

To remove FB.
To remove benign tumour.
To dilate stricture.



Oesophagoscopy

Contraindications:

Aortic aneurysm
Acute stage of corrosive oesophagitis.
Severe Kyphosis.

Complications:

Perforation of the esophagus, leading to:

- Pain: retrosternal.
- Dysphagia.
- Dyspnea: due to infection (mediastinitis) or pneumothorax (pleural injury).
- X-ray shows air in mediastinum (surgical emphysema) and in pleura (pneumothorax).

Treatment:

- Hospatiliztion with parentral antibiotics and IV fluids (nothing by mouth).
- External incision and drainage with closure of perforation in severe cases.

Dysphagia

Difficulty or mere sensation of swallowing.

N.B. *Odynophagia is a painful swallowing.*

It is a defect in deglutition, so its cauases may be:

Causes of dysphagia

1- Oral causes:

a. Congenital: cleft palate.
b. Traumatic:
- Mechanical: lacerating injury or misdirected tooth.
- Physical: radiotherapy.
- Chemical: corrosive.
c. Inflammatory: stomatitis and glossitis.
d. Neoplastic: cancer tongue.
e. Miscellaneous: Paralysis of cheek (7^{th} nerve).
Paralysis of palate (10^{th} nerve).
Paralysis of tongue (12^{th} nerve).

2- Pharyngeal causes:

a. Congenital: cleft palate.
b. Traumatic: as oral causes.
c. Inflammatory:
- Acute: Pharyngitis, tonsillitis and suppurations.
- Chronic: Plummer - Vinson's syndrome.
d. Neoplastic: All types of pharyngeal carcinoma.
e. Miscellaneous: Pharyngeal pouch.

3- Oesophageal causes:

A. In the lumen: Foreign body.

B. In the wall:

a. Congenital: - Atresia.
- Tracheo-oesophageal fistula.
b. Traumatic: - Mechanical: FB and oesophagoscopy.
- Physical: Radiotherapy.
- Chemical: Corrosive.

c. Inflammatory:
Acute: oesophagitis in exanthemata.
Chronic: - Plummer Vinson's syndrome.
- Reflux oesophagitis (GERD).
d. Neoplastic: Benign: leiomyoma.
Malignant: carcinoma.
e. Miscellaneous: Achalasia of the cardia.

C. Outside the wall: compression of oesophagus

1- In the neck:

a. Large goiter (especially cancer thyroid).
b. Large malignant lymph nodes.
c. Pharyngeal pouch.

Dysphagia lusoria with double aortic arch

2- In the chest:

a. Retrosternal goiter.
b. Mediastinal syndrome: cardiomegaly, aortic aneurysm, or bronchogenic carcinoma.
c. Dysphagia Lusoria: compression of esophagus by vascular loop (double aortic arch).

3- In the abdomen: Enlarged left lobe of liver.

The Palate

The palate is formed of 2 parts:
Hard palate: present anterior, separating oral cavity from nasal cavity.
Soft palate: present posterior, separating oropharynx from nasopharynx.

Cleft palate

a- Cleft soft palate.
b- Complete cleft palate (hard and soft, unilateral or bilateral). It may be isolated or associated with cleft lip


Cleft palate

Clinical picture:
Velopharyngeal incompetence lead to
- Escape of fluids (nasal regurgitation)
- Escape of speech (Rhinolaia aperta, hypernasality).

Treatment:
Surgical repair at the age of 10 months, with body weight not less than 10 Kg, and haemoglobin not less than 10g/dL (rule of 10).

N.B. Submucous cleft palate: cleft of the muscles with intact mucosa. It is characterized by 3 criteria: bifid uvula, bluish midline of soft palate and a notch in the posterior border of hard palate.

Palatal and pharyngeal paralysis

Nerve supply: see anatomy of the pharynx.

Causes:
1- Intracranial (i.e. central): see vocal cord paralysis.
2- Cranial (skull base lesions): see vocal cord paralysis.

Clinical picture:

Palatal paralysis:

Unilateral palatal paralysis:
Symptoms: asymptomatic (compensation by healthy side).
Signs: the uvula is deviated to the healthy side on phonation (on saying AH).

Bilateral palatal paralysis:
Symptoms: Nasal regurgitations.
Rhinolalia aperta (hypernasality)
Signs: The palate is immobile during phonation.

Unilateral palatal paralysis

Pharyngeal paralysis:

Unilateral pharyngeal paralysis:
Symptoms: asymptomatic (compensation by healthy side)
Signs: loss of pharyngeal reflex on affected side.

Bilateral pharyngeal paralysis:
Symptoms: Chocking
Dysphagia (more to fluids)
Signs: Loss of pharyngeal reflex on both sides.

Investigations: Videofluroscopy (barium swallow with video imaging).

Treatment:

- *Treatment of the cause.*
- *Unilateral paralysis (palatal or pharyngeal):* needs no treatment
- *Bilateral paralysis:*

* Palatal paralysis:
  Nasogastric tube
  Or
  Denture with posterior palatal extension
* Pharyngeal paralysis:
  Nasogastric tube
  Tracheostomy may be needed in severe chocking.

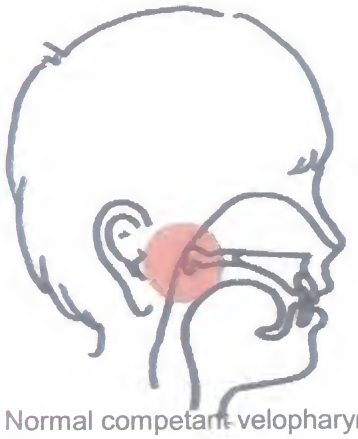
Velopharyngeal incompetence

Failure of the palate to be elevated and close the nasopharynx lead to escape of air during speech (rhinolalia aperta) and fluids during swallowing (nasal regurgitation).

***N.B.** Velopharynx is the area between nasopharynx and oropharynx*

Causes:

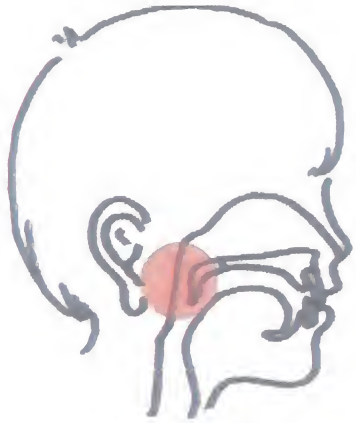
1- Congenital: Cleft palate.
2- Traumatic:
Mechanical: penetrating injury.
Chemical: corrosive leads to palatal fibrosis.
Physical: radiotherapy leads to palatal fibrosis.
3- Inflammatory:
Syphilis causes perforation of hard palate.
4- Neuromuscular:
Palatal paralysis.
5- Miscellaneous: Functional disorders
There is no organic lesion but the cause is faulty speech learning.



Normal competant velopharynx with complete closure

Clinical picture:

* Rhinolalia aperta (Hypernasality).
* Nasal regurgitation.
* Difficulty suckling in infants.
* Ear troubles (Eustachian tube dysfunction): recurrent AOM and secretory otitis media



Incompetence

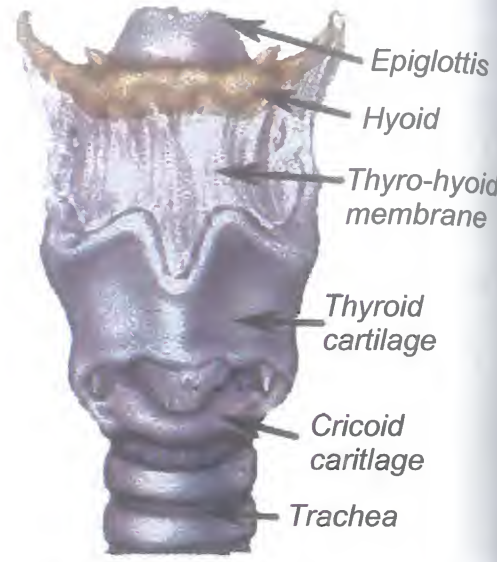
Treatment:

- **Treatment of the cause:** as
a- Repair of cleft palate (palatoplasty).
b- Pharyngoplasty or pharyngeal flap (narrowing of velopharynx).
- **Speech therapy.**

Larynx

Anatomy

The Larynx is the voice box, formed of cartilages that connected to each other by ligaments, moved by muscles, and lined by mucous membrane.



Anterior view

The Level:

- From C_3 - C_6.
- Extends from the tip of epiglottis to lower border of cricoid cartilage.
- Infront of the hypopharynx.

Cartilages:

3 single + 3 paired

A) Single cartilages:

1- Thyroid cartilage

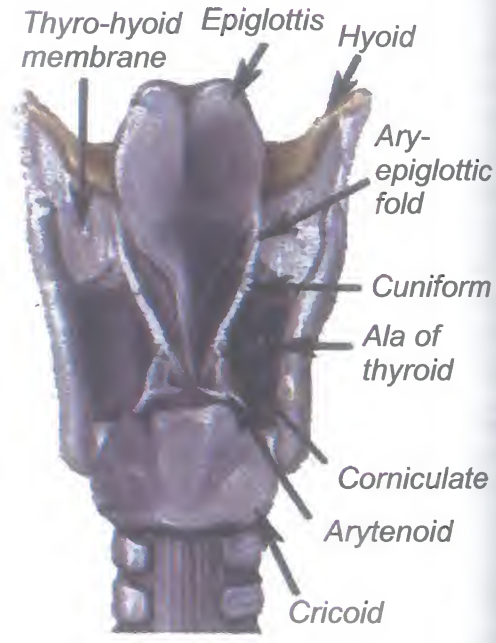
- It resembles an **open book**.
- Formed of 2 plates (alae) fused anterior at an angle (90 - 110°) which is deficient superior forming thyroid notch.
- Each ala has superior and inferior horns

2- Cricoid cartilage

- It resembles a **signet ring**.
- Formed of narrow anterior arch and wide posterior lamina.
- It is the only complete ring in respiratory system.

3- Epiglottis

- It resembles a **leafe**, and is fibro-elastic.
- Its lower part (petiol) attached to the mid-point of posterior surface of thyroid angle.
- It has multiple pits on its surface caused by the seromucinous glands (may facilitate spread of supraglottic carcinoma to pre-epiglottic space).



Posterior view

B) Paired cartilage:

1- Arytenoid cartilage

- It resembles a **pyramid**, it has apex directed upwards and base articulating with the upper surface of posterior part of cricoid (lamina),
- It has vocal process directed anteriorly for attachment of vocal cord, and muscular process directed laterally for muscle attachment.

2- Corniculate cartilage

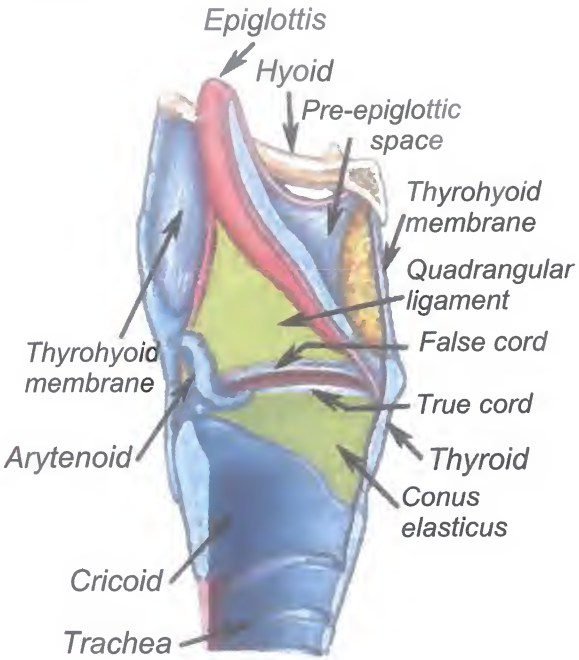
It articulates with the apex of arytenoid. It lies within the posterior part of ary-epiglottic fold.

3- Cuniform cartilage

It lies within the aryepiglottic fold infront of corniculate cartilage.
Both corniculate and cuniform cartilages reinforce the ary-epiglottic fold that forms the lateral sides of the laryngeal inlet.

Ligaments and membranes:

1- Thyrohyoid membrane and ligament: between thyroid cartilage and hyoid bone.
2- Cricothyroid membrane and ligament: between cricoid and thyroid cartilages.
3- Cricotracheal ligament: between cricoid and trachea.
4- Hyo-epiglottic ligament: between hyoid bone and epiglottis.
5- Thyro-epiglottic ligament: between thyroid cartilage and epiglottis.



Sagittal section

Intrensic ligaments:

N.B.: *There are* ***2 intrensic ligaments*** *(which is imporant for laryngeal support) present under mucosa:*

1- Quadrangular ligament:

Between the ary-epiglottic fold above and the false vocal cords below.

2- Conus elasticus:

Between the cricoid cartilage below and the true vocal cords above.

Laryngeal folds:

1-True vocal cords (vocal folds, VC):

Attached anteriorly to the mid-point of the posterior surface of thyroid angle and posteriorly to the vocal process of arytenoid.

2-False vocal cords (vestibular or ventricular folds):

Above the level of the true vocal cords.

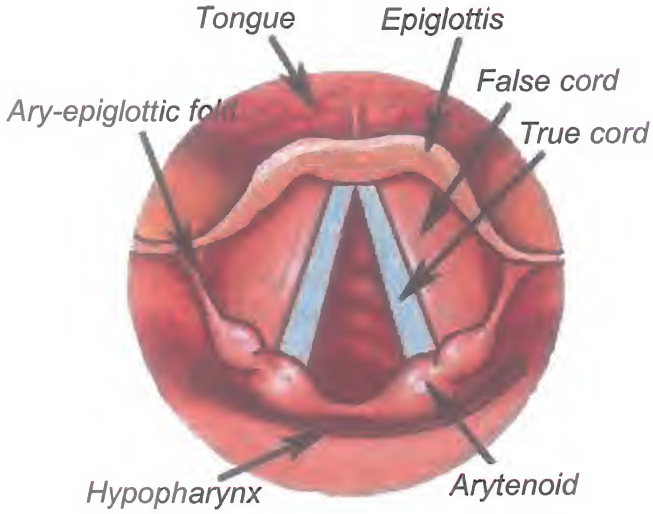
N.B.: The space between the false vocal cord and the true VC is called ventricle.

3-Ary-epiglottic folds:

Attached anteriorly to the epiglottis and posteriorly to the arytenoid.

Laryngeal inlet:

Boundaries:
Anterior: Epiglottis.
Posterior: Arytenoids.
Laterally: Ary-Epiglottic folds.



Laryngeal inlet

Spaces within the larynx:

1- Pre-epiglottic space:

Infront of the epiglottis
Boundaries:
Anterior: Thyro-hyoid membrane.
Posterior: Epiglottis.
Superior: Hyo-epiglottic ligament.

2- Paraglottic space:

Present to the side of the glottis
Boundaries:
Medially: False and True vocal cords.
Laterally: Thyroid cartilage.

N.B. Once carcinoma reach to the paraglottic space → vocal cord fixation.

The Laryngeal mucosa:
Respiratory epithelium (pseudostratified columnar), except the true vocal cords (VC) which are covered by deeply adherent non-kertinized stratified squamous epithelium.
N.B. Keratinization of laryngeal mucosa is a pre-cancerous.

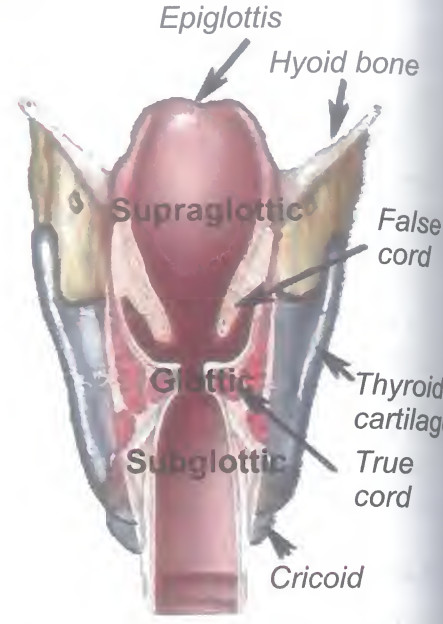
The Laryngeal muscles: See VC paralysis.

Nerve supply: See VC paralysis.

Blood Supply:
- Superior laryngeal artery: from superior thyroid artery
- Inferior Laryngeal artery: from inferior thyroid artery

The Laryngeal Cavity:
It is devided into 3 areas
1- Glottic area: at the level of true VC.
2- Supraglottic area: above the level of the true VC.
3- Subglottic area: below the level of the true VC.

N.B. the supraglottic area is subdivided into 2 areas, vestibule (the upper part, above false VC) and ventricle (the lower part, between false and true VC).



Coronal section (posterior view)

Lymphatic drainage:
Supraglottic area: to Upper deep cervical lymph nodes (LNs).
Subglottic area: to Lower deep cervical LNs (also to paratracheal LNs).
Glottic area (VC): no lymphatic drainge (has good prognosis in cancer larynx).

Physiology

The larynx has 4 functions

1-Protective function: prevent entry of food and fluids
a) Reflex closure during swallowing by 3 tires mechanism:
  - Aryepiglottic folds.
  - False vocal cords.
  - True VC.
b) Reflex elevation of the larynx during swallowing.
c) Reflex inhibition of respiration during swallowing.
d) Reflex cough: if any FB enters the larynx.


Inspiration (open glottis)

2-Respiratory function:
The vocal cords are fully abducted (open) during inspiration to allow air entry to the trachea.

3-Phonatory function:
The vocal cords are adducted (closed) during phonation (the phonation occurs during expiration).

4-Fixation of chest:
The vocal cords are adducted (to increase the intra-thoracic pressure) during lifting heavy weights, labour and defecation (i.e. the larynx close during straining).


Phonation (closed glottis)

Symptoms and methods of laryngeal examination

Symptoms of laryngeal diseases: see Clinical ENT

Hoarseness (Dysphonia):

Rough quality of low pitched voice due to one or more of 3 factors:

- Impairment of vocal cord tension.
- Impairment of vocal cord vibration.
- Impairment of vocal cord adduction

N.B. Hoarseness is caused by lesions affecting the true vocal cords.

Stridor:

Difficulty noisy breathing due to partial upper airway obstruction.
It may be:
Inspiratory: during inspiration (in glottic and supraglottic obstruction).
Expiratory: during expiration (in bronchial obstruction), it is called wheezes.
Biphasic: during inspiration and expiration (in subglottic and tracheal obstruction).
N.B. Stridor is caused by lesions narrowing the airway.

Cough: it is dry, except if it was associated with chest infection.
Chocking: due to passage of fluids or food through the laryngeal inlet.
Pain: referred to the ear through Arnold's branch of vagus.
Neck swelling: due to lymph node metastasis
Distant metastasis: in cancer larynx.

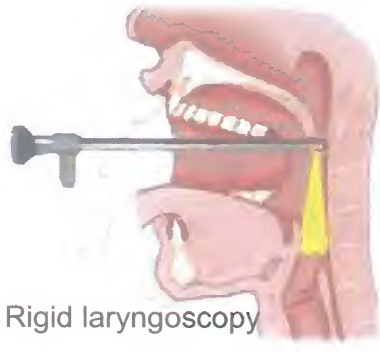
Methods of laryngeal examination: see Clinical ENT

Indirect laryngoscopy: veiwing the larynx through laryngeal mirror. The mirror should be warmed before examination to avoid condensation of vapour.
Flexible laryngoscopy: veiwing the larynx through flexible fibroptic tube introduced through the nose under local anaesthesia (LA).
Rigid laryngoscopy: using rigid Hopkins laryngoscope (70° or 90°) through the mouth under local anaesthesia.
Direct laryngoscopy: veiwing the larynx through rigid wide tube introduced through the mouth under general anaesthesia (see operations of the larynx).
Microlaryngoscopy: veiwing the larynx by direct laryngoscopy with using a microscope to magnify the veiw.
N.B. Microlaryngosurgery (MLS): surgery by microlaryngoscopy.

Indirect laryngoscopy

Stroposcopy: veiwing the vocal cords by flexible laryngoscopy with intermittent flashes of light coincding with vocal cord vibration to see the mucosal waves.

Flexible laryngoscopy



Rigid laryngoscopy

Congenital diseases

Congenital web

Fibrous band between both vocal cords (VC) anteriorly.

Clinical picture:

Symptoms:

-Small web: Asymptomatic
-Large web: Weak hoarse cry.
Stridor (inspiratory).

Signs:

Flexible laryngoscopy or direct laryngoscopy to see the web which is greyish white in colour (fibrous tissue), at anterior part between both VC, with sharp crescenteric posterior border.

Treatment:

- Small web:

No treatment but avoid upper respiratory infection (that worsen the stridor).

- Large web:

Tracheostomy in severe stridor.

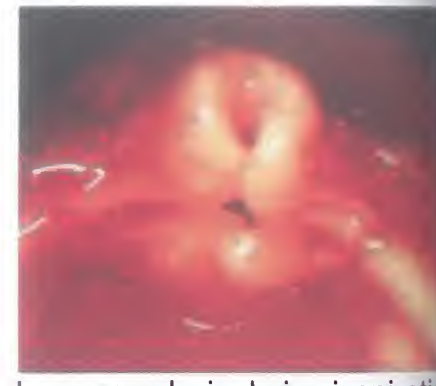
Microlaryngosurgery (MLS): Excision of the web either by Laser or conventional.

Laryngomalacia (Congenital laryngeal stridor)

Abnormal softening of the larynx that collapse during inspiration.

Pathology (causes of obstruction):

1- Abnormal softening of laryngeal cartilages.
2- Omega-shaped epiglottis.
3- Exaggerated infantile larynx (narrow subglottis).
4- Redundant ary-epiglottic fold.



Laryngomalacia during inspiration

Clinical picture:

Symptoms:

- Stridor: Inspiratory only, increased by upper respiratory infection.
- No hoarseness: as the larynx is normal during expiration with no vocal cords affection.

Signs:

Flexible laryngoscopy or direct laryngoscopy shows collapse of larynx during inspiration but it opens normally during the expiration.

Normal larynx

Treatment:

- No treatment as the condition improves spontaneously by the age of 18-24 months, but avoid upper respiratory infection.
- Tracheostomy: in severe stridor, with excision of redundant mucosa by Laser (MLS).

N.B. endotracheal intubation may be used in emergency for relieving stridor (instead of tracheostomy).

Congenital subglottic stenosis

Narrowing of subglottic area.

Subglottic stenosis

Clinical picture:

Symptoms:

- Stridor (Biphasic).
- No hoarseness as the vocal cords are normal.

Signs:

Flexible laryngoscopy or direct laryngoscopy shows the stenosis.

Treatment:

- Tracheostomy in severe stridor.
- MLS with removal of stenosis by Laser.
- Laryngofissure: if Laser failed as in thick stenosis.

Subglottic haemangioma

Clinical picture:

Symptoms:

- Stridor (Biphasic).
- No hoarseness as the vocal cords are normal.

Signs:

Flexible laryngoscopy or direct laryngoscopy shows purple subglottic mass

Treatment:

- No treatment as the condtion improves spontaneously.
- Tracheostomy: in severe stridor.
- MLS and Laser excision; in severe symptoms.

Laryngo-tracheo-oesophageal cleft

Leads to hoarseness, stridor and aspiration → chest infection.

Vocal cord paralysis

- It may be unilateral or bilateral.
- It may be due to birth trauma (brain injuries).

Congenital cyst

Cyst at the ary-epiglottic fold.

Congenital laryngeal cyst

Clinical picture:

Symptoms:

- Stridor (inspiratory)
- No hoarseness as the vocal cords are normal except in large cyst.

Signs:

Flexible laryngoscopy or direct laryngoscopy shows the cyst.

Treatment:

- Tracheostomy: in severe stridor.
- MLS and excision by Laser or conventional.

Laryngeal trauma

It may involve the soft tissues or the cartilaginous skeleton or both. Cricotracheal separation may be fatal except if urgently managed.

Types of Trauma:

1- Mechanical:

a) Surgical:
- High tracheostomy
- Endotracheal intubation
- Endoscopy (e.g. laryngoscopy and bronchoscopy)

b) Accidental:
- Gun shot, stab.
- Blow
- Car accident.
- Strangulation.
- Foreign body inhalation.

2- Physical:

- Radiotherapy (Irradiation perichondritis).
- Hot steam inhalation.

3- Chemical:

- Corrosive.
- Irritant gases.

Trauma causing blunting of thyroid angle

Fracture of cartilage

Narrow airway

Clinical picture:

Symptoms:

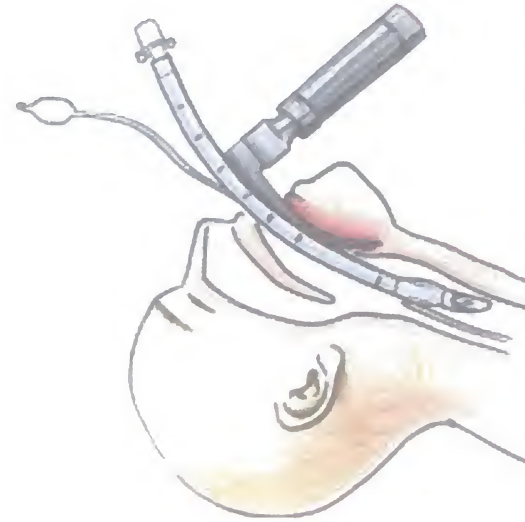
. History of trauma.
. Stridor: due to haemorrhage, haematoma or oedema in the larynx.
. Hoarseness: due to injury of vocal cords.
. Pain: referred to the ear.
. Dysphagia: caused by pain.
. Haemorrhage: if there is external wound.
. Neck swelling: oedema, haematoma or surgical emphysema (air under the skin).
. Shock: either neurogenic (pain) or hypovolaemic (haemorrhage).

Signs:

- General: Shock.
- Local:

Inspection:
. Swelling.
. Blunting of thyoid angle.

Palpation:
. Tenderness
. Crepitus (due to surgical emphysema).



Endotracheal intubation

Treatment:

1- Saving the airway by:
Tracheostomy or Endotracheal intubation.
2- Saving the blood volume (shock).
3- Systemic antibiotics to prevent infection.
4- Steroid to decrease the oedema.
5- Management of the pathology:
a) Ligation of bleeding vessels.
b) Reduction and fixation of fractured cartilages.

Foreign body inhalation (in the airway)

Type of patient: more common in children.

Types of foreign bodies (FB):
1) Exogenous FB:
- Vegetable: as water melon seeds, beans.
- Non-vegetable: as pins and beads.

2) Endogenous FB: as vomitus or blood.

Site of impaction:
An inhaled FB is rarely impacted in the larynx leading to severe stridor. It usually passes to the right bronchus (as it is wider and more in a line with the trachea).

Clinical picture: 3 stages

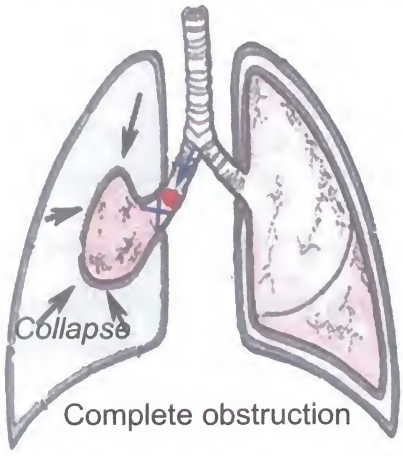
1- Initial stage:
Attack of coughing, chocking, dyspnea and cyanosis in a young child during eating (is suspicious of FB inhalation).

2- Latent stage:
Period with no symptoms, a vegetable FB soon causes acute vegetal bronchitis as an allergic reaction to the vegetable oil, while metallic FB may remain latent for longer period.

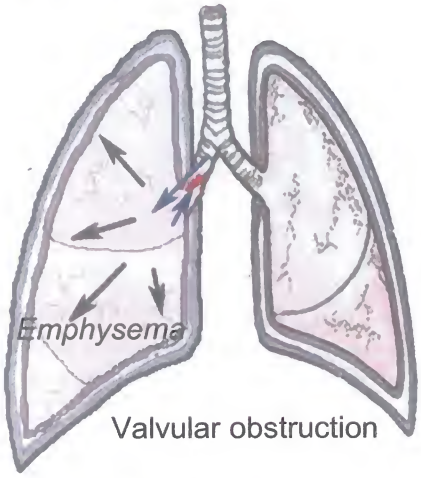
3- Manifest stage:
The patient presented with dyspnea with either complete or partial valvular obstruction.

a) Complete obstruction: leads to lung collapse:
- Dullness on percussion.
- Shift of mediastinum to the same side.
- No air entery on auscultation.

b) Partial valvular obstruction: leads to emphysema.
- Hyper-resonance on percussion.
- Shift of mediastinum to the opposite side.
- Diminshed air entery on auscultation.



Complete obstruction



Valvular obstruction

Investigations:
- X-ray may show radio-opaque FB, collapse or emphysema.
- Bronchoscopy: is diagnostic to see the FB.

Treatment:
Removal by bronchoscopy under special technique of anaesthesia.

N.B. Heimlich maneuver:
Sudden compression of the upper abdomen and xiphisternum is done in the initial stage of FB inhalation to extrude it.


Heimlich maneuver

Laryngeal inflammations

Acute:

Specific: *Diphtheria.*

Non specific: *Laryngitis*
Epiglottitis.
Laryngo tracheobronchitis.

Chronic:

Specific (granuloma): *Scleroma*
Syphilis
T.B.
Leprosy
Fungal infection

Non specific:

Atropic

Hypertrophic: *Diffuse*
Localized: *a. Nodes* *b. Polyp* *c. Leukoplakia*

I) Acute Inflammations:

Acute non specific laryngitis

Acute inflammation of laryngeal mucosa.

Causes:

- It is usually associated with upper respiratory infection (as common cold or exanthemata)
- Organisms: starts by viral then 2ry bacterial infection.
- Predisposing factors:

Local: abuse of voice and smoking.
General: low general resistance and pollution.

Normal

Clinical picture:

Symptoms:

General: Fever, headache, and malaise.
Local: Hoarseness (the main symptom in adults).
Stridor (the main symptom in children).

Signs: Diffuse congestion and oedema of VC and laryngeal mucosa especially subglottic area in children.

Acute laryngitis

Treatment:

- General: Complete bed rest + plenty of warm fluids.
Systemic antibiotics + Analgesics.
- Local: Complete voice rest.
Steam inhalation with tincture benzoine.

N.B. Acute non specific Laryngitis In children:

It is more dangerous than in adults (causing stridor in children) ***due to:***

1- **S**mall larynx of infants (easy obstruction).
2- **S**ubmucosa is loose (easy oedema).
3- **S**ubglottic area is narrow as the infantile larynx is funnel-shaped (easy obstruction)
4- **S**oft laryngeal cartilages of infantile larynx (easy collapse).

It is the commonest cause of stridor in children.
It should be managed urgently and promptly to avoid the consequences.

Treatment of acute laryngitis with stridor (children):

Hospitalization +

1. **S**ystemic antibiotics by injection.
2. **S**teroids: to decrease the oedema.
3. **S**upplying oxygen inhalation.
4. **S**team inhalation with tincture benzoine.
5. **S**aving the airway by endotracheal intubation, or tracheostomy in severe stridor.

Acute epiglottitis (Supraglottitis)

Inflammation of the mucosa of the epiglottis.

Causes:

- It may be preceded by upper respiratory infection.
- Organism: Haemophilus Influenza.
- More in children.

Clinical picture:

Symptoms:

General: Fever, headache, and malaise.

Local: - Hot potato voice (due to supraglottic oedema).
- Stridor: inspiratory.
- Dysphagia and odynophagia.

Signs: Severely congested and oedematous epiglottis.

Treatment: The same as acute laryngitis with stridor (in children).

Acute laryngotracheobronchitis (Croup)

Acute inflammation of laryngeal and lower respiratory mucosa.

Causes:

- It is usually associated with upper respiratory tract infection.
- Organism: usually Viral.
- More in children.

Clinical picture:

Symptoms:

General: Fever, headache, and malaise.

Local: - Stridor.
- Hoarseness.
- Cough and expectoration.

Signs: Subglottic oedema and congested laryngeal mucosa.

Treatment: The same as acute laryngitis with stridor (in children).

Laryngeal diphtheria (specific)

It is usually secondary to pharyngeal (faucial) diphtheria.

Clinical picture: manifestations of faucial diphtheria in addition to

Symptoms: - Hoarseness
- Stridor.

Signs: Dirty greyish pseudomembrane over the laryngeal inlet.

Investigations: as faucial diphtheria.

Treatment: as faucial diphtheria, in addition to

- **S**aving the airway by tracheostomy or endotracheal intubation in severe stridor.
- Antitoxic **S**erum and **S**ystemic antibiotics.

II) Chronic non specific inflammations:

1- Chronic atrophic laryngitis

- It is usually associated with atrophic rhinitis.
- The laryngeal mucosa is pale, dry and covered with crusts.

Clinical picture:

Hoarseness.
Stridor (obstruction by crusts).

Treatment:

Potassium iodide to dissolve the crusts.
Direct laryngoscopy to remove the crusts (if causing stridor).

2- Chronic diffuse hypertrophic laryngitis

Chronic diffuse inflammation with hypertrophy of laryngeal mucosa.

Causes:

- Repeated acute attacks.
- Persistence of the predisposing factors.

Hypertrophic laryngitis

Clinical picture:

Symptoms:
Hoarseness.
Irritative dry cough.
Signs:
Bilateral diffuse symmetrical thickening and congestion of vocal cords seen by indirect or flexible laryngoscopy.

Treatment:

1. Avoid the predisposing factors.
2. **S**team inhalation with tincture benzoine.
3. Microlaryngo**s**urgery with **s**tripping of vocal cords (either conventional or laser) followed by **s**peech therapy.

N.B. Reinke's oedema: *is oedema of the subepethelial space of the VC.*

3- Chronic Localised hypertrophic laryngitis:

A) Vocal cord nodules (singer's nodes)

Localized areas of vocal cord hyperplasia.

Causes:

Voice abuse → Subepithelial haematoma → Organization.
So it is called: singer's or teacher's nodes, and in children: screamer's nodes.

Laryngeal nodules

Clinical picture:

Symptoms: Hoarseness of voice.
Signs: Bilateral small nodules at the junction between anterior $^{1}/_{3}$ and posterior $^{2}/_{3}$ of vocal cords.

Treatment:

1. Complete voice rest.
2. Speech therapy: if the nodules are small.
3. Microlaryngosurgery with removal of the nodules either by laser or conventional followed by speech therapy.

B) Laryngeal polyp

Polypoid mucosa on the vocal cord.

Causes:

Voice abuse.

Clinical picture:

Symptoms: Hoarseness of voice.

Signs: Sessile or pedunculated unilateral polyp which may be greyish (oedematous polyp), reddish (vascular polyp) or whitish (fibrotic polyp).

Treatment:

1. Complete voice rest.
2. Microlaryngosurgery with removal of the polyp either by laser or conventional followed by speech therapy.

Laryngeal polyp

C) Leukoplakia

Grossly: Raised white patch on the surface epithelium.

Microscopically: Hyperplasia, hyperkeratosis, and acanthosis, but the basement membrane is intact.

It is caused by chronic irritation to the laryngeal mucosa (e.g. smoking)

It is a pre-cancerous lesion.

Clinical picture:

Symptoms: Hoarseness of voice.

Signs: As gross picture.

Treatment:

Microlaryngosurgery with removal of the lesion either by laser or conventional followed by regular follow-up (as the lesion is pre-cancerous).

Leukoplakia

III) Chronic specific inflammations (Granuloma of larynx):

Chronic specific inflammation characterized by formation of macrophages.

(1) Laryngoscleroma

- It is caused by klebsiella rhinoscleromatis.
- It is usually 2ry to rhinoscleroma.
- It is the commonest ENT granuloma in Egypt.

Site: Subglottic area, starts as bilateral nodules then masses then web (its pathology is the same as rhinoscleroma).

Symptoms:

Biphasic stridor.

Hoarseness of voice (is not marked).

Crusty expectoration.

Signs:

Indirect or flexible laryngoscopy shows subglottic masses or web.

Subglottic masses

Investigations:

- X-ray: narrow air column.
- CT: to show site, degree and length of stenosis.
- Direct laryngoscopy and biopsy: Russel bodies and Mikulicz cells in active stage.

Treatment:

1- Medical treatment:

- Rifampicin: 600mg/day (side effects= hepatotoxic and red discolouration of urine).
- Streptomycin: 1gm/day for 40 days (not used nowadays; ototoxic and nephrotoxic).

2- Surgical treatment:

(a) Tracheostomy (low): in severe stridor.
(b) Microlaryngosurgery and excision of the web by laser.
(c) Laryngofissure (if the web is thick) with removal of web and covering the raw area by skin graft.

(2) T.B. laryngitis:

- Caused by mycobacterium T.B.
- Usually associated with pulmonary T.B.

Inter-arytenoid TB granulation (Pal

Site: **posterior** part of larynx **(interarytenoid)**.

Symptoms:

Hoarseness of voice.
Stridor.
Pain referred to the ear.
Cough, hemoptysis due to pulmonary T.B.
T.B. toxaemia:
. Night fever and night sweating.
. Loss of weight and loss of appetite.

Signs:

Indirect or flexible laryngoscopy shows T.B. granulations in the posterior part of larynx.

Complications: Perichondritis → necrosis of cartilage → laryngeal stenosis.

Treatment:

1. Tracheostomy in severe stridor.
2. Antituberculous: Rifampicin, and Isoniazid.

(3) Syphilis:

- Caused by treponema pallidum.

Syphilis (Gumma)

Site: Gumma affects **anterior** part of larynx.

Symptoms:

Hoarseness of voice.
Stridor.
No pain.

Signs:

Indirect or flexible laryngoscopy shows syphilitic granulations in the anterior part of larynx.

Complications: Laryngeal stenosis (as T.B.).

Treatment:

1. Tracheostomy: in severe stridor.
2. Antisyphilitic: penicillin.

(4) Leprosy:

- Caused by mycobacterium leprae.

Site: **anterior** part of larynx.

Clinical picture, complication, and treatment: similar to T.B. laryngitis

(5) Fungal infections:

Occur in patients with low immunity; in diabetics, prolonged antibiotic therapy or AIDS.

A. Moniliasis:

- Caused by candida albicans.
- Usually associated with aerodigestive moniliasis.
- Characterized by milky whitish pseudomembrane.
- Treatment: antifungal as nystatin.

B. Histoplasmosis:

- Systemic fungal infection caused by histoplasma capsulatum.
- It causes nodules in the anterior part of the larynx that may ulcerate.

C. Actinomycosis:

- Caused by actinomycoses Israeli (? bacteria).
- It causes cervical sinus with sulphur granules.

Intubation granuloma

Intubation granuloma

Granuloma over the vocal process of the arytenoids

Cause:

Trauma by the endotracheal tube during anaesthesia

Clinical picture:

Symptoms: Hoarseness and stridor if it is large.

Signs: Mass over the vocal process of arytenoids (i.e. posterior part of VC, unilateral or bilateral).

Treatment:

Microlaryngosurgery with removal either conventional or laser (recurrence is high)

Perichondritis of the larynx

Inflammation of the perichondrium of the laryngeal cartilage.

Causes:

1- Traumatic: Mechanical, chemical or physical.
2- Inflammatory: T.B., syphilis or leprosy.
3- Neoplastic: Cancer larynx invading laryngeal certilage.

Laryngeal cartilages

Clinical picture:

Symptoms:

- General: Fever, headache and malaise.
- Local: Stridor.
  Hoarseness.
  Pain in the neck referred to the ear.
  Dysphagia.

Signs:

- Inspection: Broadening of larynx.
- Palpation: Tenderness.
- Indirect or flexible laryngoscopy: Congested oedematous laryngeal mucosa.

Complications: Necrosis of the cartilages and stenosis (due to fibrosis).

Treatment:

Medical:

Systemic parenteral antibiotics + Analgesic antipyretics.

Surgical:

- Tracheostomy: if there is severe stridor.
- Incision and drainage of pus with removal of necrosed cartilage.
- Laryngectomy (rarely needed): if there is extensive necrosis.

Tumours of the larynx

	Benign	Malignant
Epithelial	Papilloma (+) Adenoma	Squamous cell Ca (+++) Adenocarcinoma
Mesenchymal	Haemangioma Chondroma	Angiosarcoma Chondrosarcoma

Benign tumours

Papilloma:

Type	**Single papilloma**	**Multiple papillomatosis**
Synonyms	Papilloma of adults	Juvenile papillomatosis, Recurrent respiratory papillomatosis
Age	Adults	Children
Sex	More in males	More in males
Causes	True benign tumour	Unknown but may be: 1-Autoimmune 2-Viral (Human Papilloma Virus) 3-Hormonal disturbance (Estrogen deficiency)
Pathology	- *Gross picture:* arises at VC, whitish, warty, sessile or pedunculated. - *Microscopic picture:* Papilloma = vascular connective tissue core covered by hyperplastic stratified sq. epithelium	- *Gross picture:* multiple warty growths, sessile, affecting any part of larynx even trachea and bronchi, and around the tracheostomy opening. - *Microscopic picture:* papilloma but multiple.
Symptoms	Hoarseness. Stridor is rare (if large).	Stridor. Hoarseness.
Signs	As gross picture	As gross picture
Treatment	Microlaryngosurgery with removal either conventional or by laser	1-Tracheostomy: in severe stridor. 2-Microlaryngosurgery: removal either conventional or laser (better) 3-Interferon (antiviral) 4-Estrogen (hormonal)
Prognosis	Malignant transformation in 5% of cases	- High recurrence rate - Spontaneous regression at puberty - Never turn malignant

Cancer Larynx

Incidence: It constitutes about 40% of head and neck cancers
Age: old (above 40 years).
Sex: more common in males (Male : Female = 8:1)


Smoking and Alcohol

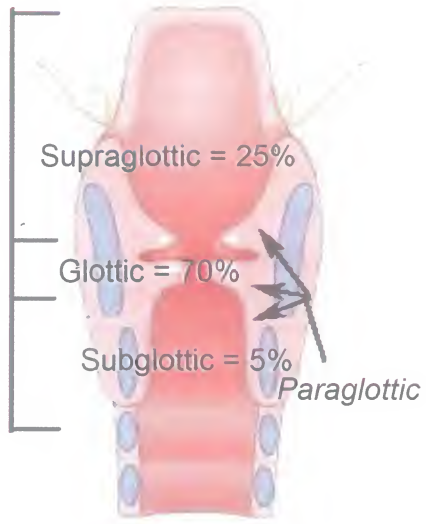
Predisposing factors:
1- Smoking: Nitrocarbon is carcinogenic.
2- Alcohol: predispose to supraglottic carcinoma.
3- Smoking and alcohol have synergistic effect.
4- Irradiation.

Pre-cancerous lesions:
1- **S**ingle papilloma of adults.
2- **L**eukoplakia.
3- Laryngeal **K**eratosis.

Pathology:
Gross Picture:
Shape: Ulcer, cauliflower or nodular infiltrative
Sites: - Glottic: 70%
- Supraglottic: 25%
- Subglottic: 5%

N.B.: Transglottic carcinoma = reaching to paraglottic space.

Microscopic picture:
Squamous cell carcinoma in 98% of cases.



Spread:
A-Local spread: to the surrounding structures.
N.B.: *Extension of glottic carcinoma to anterior commissure has bad prognosis. (Anterior commissure = anterior attachment of vocal cord to thyroid cartilage).*
N.B.: *Extension of supraglottic carcinoma to epiglottis has bad prognosis (due to the presence of pits).*

B-Lymphatic spread:
**** Supraglottic area:***
To upper deep cervical LNs.
High incidence (50%).
One of silent areas.
**** Subglottic area:***
To lower deep cervical LNs and paratracheal and superior mediastinal LNs.
Bad prognosis
**** Glottic area:*** has no lymphatic drainage (good prognosis)
**** Transglottic carcinoma:***
High incidence (20%)
Bad prognosis

C-Blood spread: LLBB (Lung, Liver, Bone and Brain)

Prognosis:
- Glottic carcinoma: has good prognosis due to early symptoms (hoarseness) and no lymphatic metastasis.
- Subglottic carcinoma: has bad prognosis due to paratracheal and superior mediastinal LNs spread.

Clinical picture

Symptoms:

a. Symptoms of primary tumour:

- **Hoarseness** of voice: Early in glottis carcinoma

N.B. Old male with progressive or persistent hoarseness for more than 2 weeks should be examined carefully to exclude cancer larynx especially if he is a smoker.

- **Stridor**: Early in subglottic carcinoma

-**Discomfort sensation in the throat**: Early in supraglottic carcinoma

- **Referred otalgia**: via Arnold's branch of vagus.

b. Symptoms of local spread:

Dysphagia if extended to the hypopharynx.

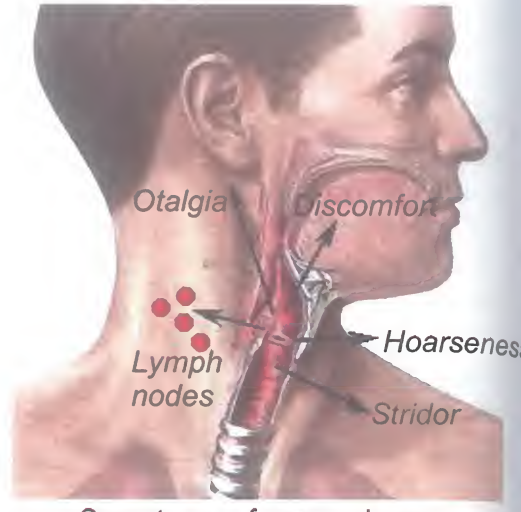
c. Symptoms of lymphatic spread:

Neck swelling (lymph node enlargement)

d. Symptoms of blood spread (rare): LLBB

To Lung: cough, haemoptysis, and chest pain

To Liver, Bones and Brain (very rare).



Symptoms of cancer larynx

Signs:

A) Local examination:

Larynx: Indirect or flexible laryngoscopy

To detect site, size, shape, extension of the tumour, mobility of VC and airway chink.

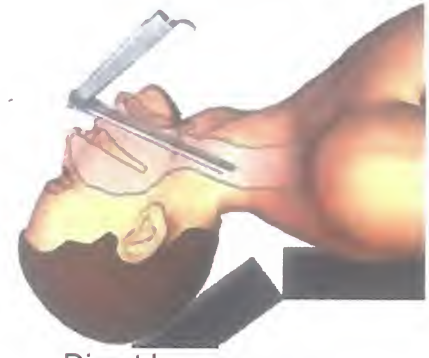
Neck: to exclude lymph node metastasis.

B) General examination:

To exclude distant metastasis especially lung.

Investigations:

- Direct Laryngoscopy (DL) and biopsy.
- CT: to see site, size, extension of the tumour and to detect LNs metastasis if not palpable.


Direct laryngoscopy

TNM classification

- *T (Primary Tumour):*

Tis: Carcinoma in situ.

T_1: Tumour limited to one area (supra-, sub-, or glottic) with mobile vocal cords.

T_2: Tumour extended to more than one area with mobile vocal cords.

T_3: Tumour limited to the larynx with fixed vocal cords.

T_4: Tumour extended to the laryngeal cartilage and/or extra-laryngeal spread.

- *N (Lymph Node):*

No: No palpable lymph nodes.

N_1: Single, Ipsilateral, 3 cm or less in diameter.

N_2: **a**: Single, Ipsilateral, 3-6 cm in diameter.
b: Multiple, Ipsilateral, non more than 6 cm in diameter.
c: Contralateral or bilateral, non more than 6 cm in diameter.

N_3: Node (s) more than 6 cm in diameter.

- *M (Distant Metastasis):*

Mo: No distant metastasis.

M_1: There is distant metastasis.

Treatment:

Curative treatment: Surgery
Or Radiotherapy
Or Combined (both)

Palliative treatment: Pain killers (analgesics)
Palliative surgery as tracheostomy for stridor, and gastrostomy for severe dysphagia.
Palliative radiotherapy and chemotherapy

N.B.: *Palliative treatment is indicated in cases of extensive cancer larynx fixed to the vertebral column and/or with distant metastasis.*

Curative treatment:

For primary tumour and for lymph nodes.

 # For Primary tumour:

Glottic carcinoma:

Tis: Surgcal excision (microlaryngosurgery either laser or conventional)
T1: Either surgical excision (cordectomy) [by laser microlaryngosurgery or rarely external laryngofissure) **or** Radiotherapy
T2: Either surgical excision (partial laryngectomy) **or** Radiotherapy
T3, T4: Surgical excision (total laryngectomy) **and** Radiotherapy (postoperative).

Supraglottic carcinoma:

T1, T2: Either surgical excision (partial laryngectomy) **or** Radiotherapy
T3, T4: Surgical excision (total laryngectomy) **and** Radiotherapy (postoperative).

Subglottic and transglottic carcinoma:

Surgical excision (total laryngectomy) **and** Radiotherapy (postoperative).

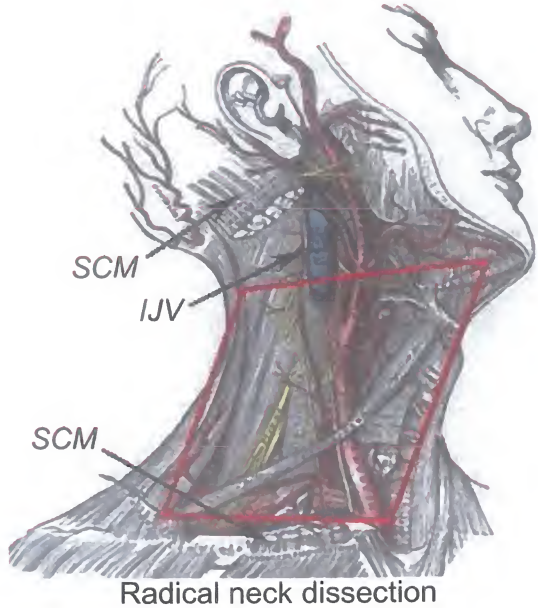
N.B. Supracricoid laryngectomy with cricohyoidopexy may be used nowadays for treatment of T1 and T2 supraglottic and transglottic cancer not reaching to either arytenoids and without subglottic extension. It aims to avoid permanent tracheostomy.

 # For Lymph nodes (LNs):

- If palpable: Radical neck dissection (RND).
- If not palpable: Selective neck dissection or radiotherapy to the neck especially in supraglottic carcinoma as it is rich in lymphatics.

Radical neck dissection:

Removal of all lymphoid tissues from the mandible above to the clavicle below and from midline anterior, to the anterior border of Trapezius posterior
+ Removal of **3** structures:
1- Sternomastoid muscle (SCM).
2- Internal jugular vein (IJV).
3- Accessory nerve.



Radical neck dissection

Total laryngectomy

Removal of the whole larynx.

Indications:

1- T_3 and T_4 glottic and supraglottic carcinoma.
2- All subglottic and transglottic carcinoma.
3- Recurrence after partial laryngectomy.
4- Recurrence after radiotherapy.

Contraindications:

1- Refusal of the patient to remove his larynx.
2- Extensive tumour fixed to important structure as vertebral column or with distant metastasis (palliative treatment)

Before laryngectomy

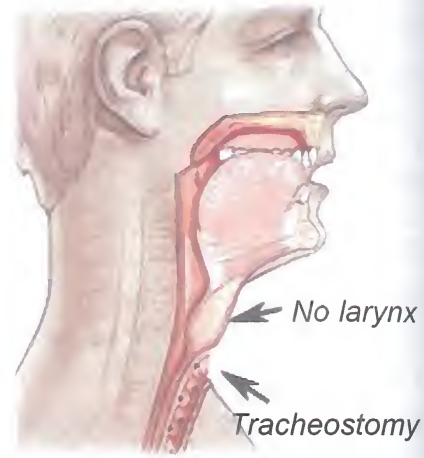
Disadvantages:

1- Loss of laryngeal function:

a) Respiratory: Permanent tracheostomy.
b) Protective function: inability to swim.
c) Phonation.
d) Fixation of chest: inability to do heavy manual work.

2- Loss of nasal function:

as smell and humidification.



After laryngectomy

Rehabilitation of voice after total laryngectomy:

By one of the following methods
1- Oesophageal speech: needs speech training.
2- Electronic larynx: hold by the patient's hand.
3- Speaking valve (Provox): introduced in a surgically induced tracheao-oesophageal fistula.

Partial laryngectomy

1- Horizontal (supraglottic) laryngectomy:

In supraglottic carcinoma not reaching to VC.

Electronic larynx

2- Vertical hemilaryngectomy:

In Glottic carcinoma with mobile vocal cords (T_2).
a) Lateral vertical hemilaryngectomy: In carcinoma limited to middle part of VC.
b) Frontal vertical hemilaryngectomy: In carcinoma limited to anterior commissure.
c) Frontolateral vertical hemilaryngectomy: In carcinoma of VC reaching to anterior commissure.


Horizontal laryngectomy


Lateral hemilaryngectomy


Frontal hemilaryngectomy


Frontolateral hemilaryngectomy

Vocal Cord Paralysis

Muscles of the Larynx:

1- Tensor: Crico-thyroid muscle
It increases the tension of VC → higher the voice pitch.
It has also some adductor action.

2- Abductor: Posterior crico-arytenoid muscle.
It opens the glottis in inspiration.

3- Adductors: a. Thyro-arytenoid muscle.
b. Lateral crico-arytenoid muscle.
c. Inter-arytenoid muscle.
They close the glottis in phonation and swallowing.


Abduction

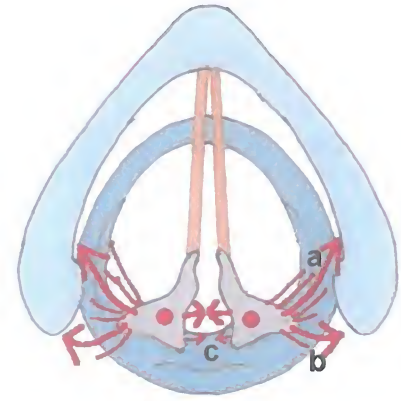
Nerve Supply:

Via vagus nerve by 2 branches

a. Superior laryngeal nerve (SLN):
- Motor to cricothyroid muscle (via External branch).
- Sensory to mucosa above VC (via Internal branch).

b. Recurrent laryngeal nerve (RLN):
- Motor to all laryngeal muscles except cricothyroid.
- Sensory to mucosa below VC.

N.B. *The left RLN has a longer course than the right RLN, as the left enters the chest and turns around the Aortic arch while the right does not enter the chest and turns around the subclavian artery at the root of the neck. So the left one is more liable to be paralysed.*



Adduction

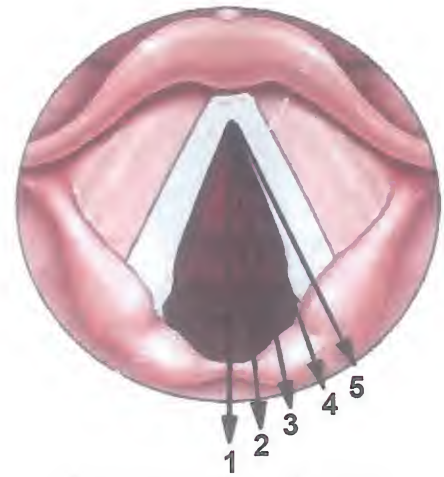
Positions of vocal cords:

1- Median: the VC is in midline position (chink = 0).
2- Paramedian: The VC is in paramedian position (chink = 4 mm).
3- Cadaveric: The VC is in intermediate position (chink = 8 mm).
4- Abduction: The VC is in abduction position (chink = 14 mm).
5- Full abduction: The VC is in full abduction position (chink = 18 mm).

Explanation of positions:

Wagner and Grossman theory

Injury of vagus → Cadaveric position (All muscles are paralysed)
Injury of RLN → Paramedian position (as the crico-thyroid has some adductor action and it is supplied by SLN). However the small variations between both positions are due to fibrosis of paralysed muscles.



Positions of vocal cord

Causes of vocal cord paralysis:

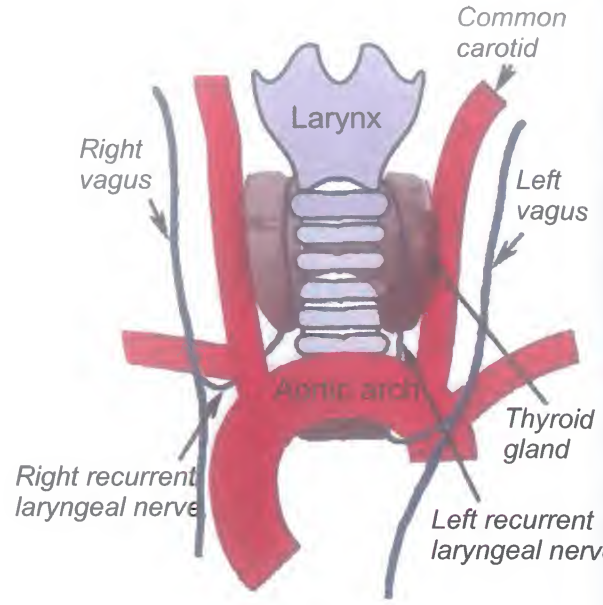
1- Intracranial (i.e. central):

a. Traumatic: head trauma or car accident.
b. Inflammatory: meningitis or encephalitis.
c. Neoplastic: brain tumour.
d. Vascular: thrombosis, heamorrhage or embolism (THE).
e. Degenerative: multiple sclerosis (MS).

2- Cranial (i.e. skull base at jugular foramen= jugular foramen syndrome):

Injury of vagus at its exit from jugular foraman, it may involve the lower 4 cranial nerves.

a. Traumatic: Fracture base of the skull.
b. Inflammatory: Malignant otitis externa.
c. Neoplastic: Carcinoma of nasopharynx, glomus tumour.



3- Extracranial:

a. In the neck:

- Thyroid operations (right RLN is more liable for injury as it lies laterally).
- Cancer thyroid.
- Malignant lymph nodes.
- Neck injury.
- Cancer oesophagus

b. In the chest (left only):

- Bronchogenic carcinoma.
- Cardiothoracic operations.

4- Idiopathic:

In 25% the cause is unknown but may be peripheral neuritis (viral or diabetic).

Clinical Picture:

Symptoms:

Unilateral paralysis:

* Hoarseness: which improve spontaneously after 6-12 months as the healthy cord cross the midline to meet the paralysed cord (compensation).
* No stridor.

Bilateral paralysis:

* Stridor: due to narrowing of the glottis by both immobile cords (narrow chink).
* The voice is relatively good (No hoarseness, as both cords present near midline).

Signs:

- Examination of the larynx: indirect or flexible laryngoscopy to detect the position of VC.
- Examination of the head, neck and chest: to detect the cause of paralysis.

Unilateral paralysis (left) | Compensation by right cord | Bilateral paralysis

Investigations:

- **CT:** from the skull base to the mid-thorax (to detect any tumour mass).
- **Barium swallow:** if cancer oesophagus was suspected.
- **Thyroid scan:** if cancer thyroid was suspected.
- **Panendoscopy:** All endoscopies (Naso, laryngo, Hypopharyngo, oesophago, and bronchoscopy) and take a biopsy from suspicious lesion especially in unilateral cases.
- **Stroboscopy:** Intermittent flashes of light coinciding with VC movement to see the mucosal waves. This is done by the use of flexible laryngoscopy.

Treatment:

Unilateral Paralysis:

1. **Treatment of the cause** (if present): as tumour e.g. bronchogenic carcinoma.
2. **Wait 6-12 months** before intervention as spontaneous compensation occurs.
3. **Surgical treatment:**

- Indications:

No compensations after 6-12 months.

- Aim:

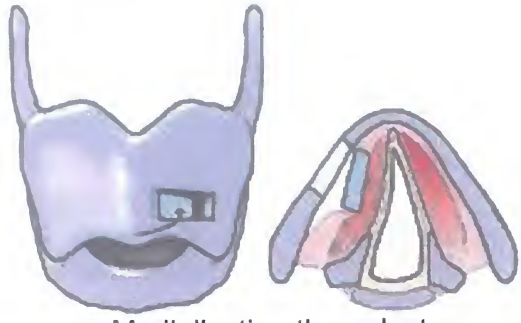
Medial displacement and fixation of the paralysed cord in the midline (to improve voice).

- Types of operations:

a- Teflon injection lateral to the paralysed cord.

b- Medialization thyroplasty (medial displacement of the paralysed cord by implant).

c- Reinnervation procedures which is called (Tucker's operation).



Medialization thyroplasty

Bilateral paralysis:

1. **Tracheostomy:** if there is severe stridor.
2. **If detected at the end of thyroidectomy → re-exploration** as the nerve may be taken in a ligature.
3. **Surgical treatment:**

- Aim:

Lateral displacement of one of the paralysed cords to improve the airway.

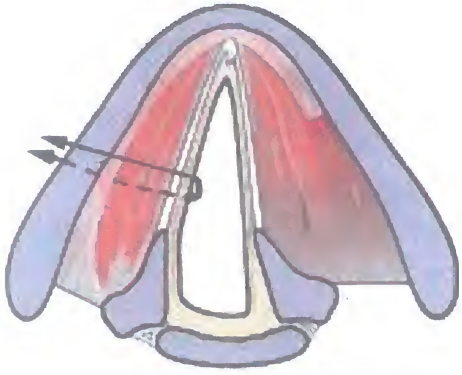
- Types of operations:

a- Arytenoidectomy ± posterior cordectomy: (done by Laser microlaryngsurgery).

b- Woodman's operation: arytenoidectomy + cordopexy (via external approach).

c- Lateralization thyroplasty.

d- Reinnervation procedures (Tucker's operation).



Lateralization thyroplasty

Laryngeal oedema

Causes:

1- Traumatic: mechanical, chemical and physical.

2- Inflammatory:

- Acute: specific and non-specific especially in children.
- Chronic specific: granuloma obstructing lymphatics.
- Extension of oedema from pharyngeal suppurations.

3- Neoplastic: Tumour obstructing lymphatic drainage.

4- Miscellaneous:

- Angioneurotic oedema as allergy.
- Cardiac, Renal and Hepatic oedema (in failure).

Clinical picture:

Symptoms: Stridor.
Hoarseness.

Signs: Indirect or flexible laryngoscopy shows oedema of laryngeal mucosa.

Treatment:

Medical: Oxygen inhalation and antioedematous drugs as hydrocortisone injection (IV)

Surgical: Airway saving by tracheostomy or endotracheal intubation in severe stridor.

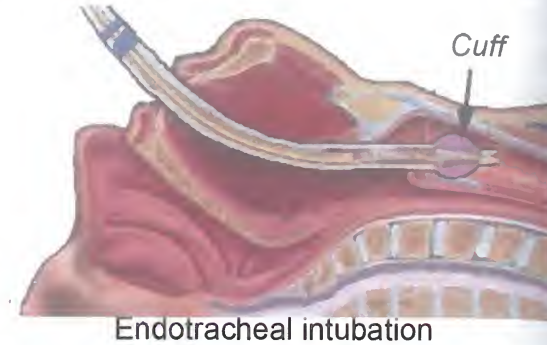
Laryngeal stenosis

Narrowing of the laryngeal lumen, it is common in subglottic region.

Causes:

A) Congenital: Failure of recanalization of the laryngeal lumen.
B) Traumatic: Mechanical, chemical or physical.
C) Inflammatory: All types of granuloma.
D) Neoplastic:
1- Carcinoma invading the cartilage.
2- Carcinoma treated by radiotherapy.

N.B.: The commonest causes of laryngeal stenosis are:
1- Prolonged cuffed endotracheal intubation is the commonest cause (used in ICU for ventilation).
2- Laryngoscleroma is the 2nd common cause.



Endotracheal intubation

Clinical picture: (of subglottic stenosis).

Symptoms:
- Stridor (Biphasic).
- No haorseness: as no affection of VC.

Signs:
Indirect or flexible laryngoscopy shows the stenosis.

Investigations:
- CT to show: Site of stenosis.
  Degree of stenosis.
  Length of stenosis.
- Direct laryngoscopy (DL).


Subglottic stenosis

Treatment:
- Tracheostomy: in severe stridor.
- Microlaryngosurgery with laser excision of the stenosis.
- Laryngofissure (in thick fibrosis): with excision of fibrous stenosis and covering the raw area by skin grafts.

N.B. Laryngeal stenosis is more common nowadays because of the advances in trauma management (e.g. car accident) with increase in number of intubated patients in ICUs.

Laryngocele

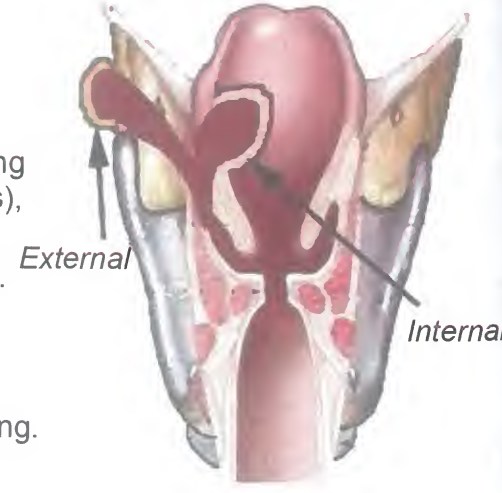
It is a cystic herniation of laryngeal saccule (the anterior end of the ventricle).

Cause:
Congenital or acquired (caused by repeated straining as in glass blowers and players of wind instruments),

Types:
Internal or external (through thyrohyoid membrane).

Clinical picture:
Hoarseness
Stridor
Neck swelling (external type): increases with straining.

Treatment:
- Microlaryngosurgery for internal laryngocele.
- External excision for external laryngocele.



Laryngocele

Symptomatology

Stridor

Difficulty noisy breathing due to partial upper airway obstruction (Larynx ± Trachea).

Causes:

1. Congenital: All (see before).

2. Traumatic: All (see before).

3. Inflammatory:

- Acute non-specific: Acute laryngitis in children (?).
  Acute epiglottitis.
  Acute laryngotracheobronchitis.
- Acute specific (diphtheria)
- Chronic specific: granulomas (see before)

4. Neoplastic: Benign: Multiple papillomatosis
Malignant: Cancer larynx.

5. Miscellaneous: Bilateral abductor VC paralysis.
Laryngeal oedema.
Laryngeal stenosis.

N.B. Causes of stridor in children:

1. Congenital: All.
2. Traumatic - FB inhalation.
   - Corrosive laryngitis.
3. Inflammatory: All acute (?).
4. Neoplastic: Juvenile multiple papillomatosis.
5. Miscellaneous:

- Laryngismus stridulus: laryngeal spasm due to calcium deficiency in tetany.
- Laryngeal oedema.
- Bilateral abductor VC paralysis.

Clinical picture of upper airway obstruction:

- Stridor.
- Irritability, restlessness and fatigue.
- Tachycardia (↑ pulse rate).
- Tachypnea (↑ respiratory rate).
- Working alae nasi.
- Working accessory muscles of respiration.
- Retraction of suprasternal, supraclavicular, intercostal and subcostal spaces.
- Congested neck veins.
- **Late signs:** bradycardia and cyanosis.

Hoarseness of voice (Dysphonia)

Hoarseness

Rough quality, low-pitched voice due to one or more of 3 factors:
Impairment of VC Adduction.
Impairment of VC Tension.
Impairment of VC Vibration (Mobility).

Causes:

1. Congenital: as web.

2. Traumatic: All.

3. Inflammatory: All acute and chronic (specific and non).

4. Neoplastic: Benign or malignant tumour reaching to VC.

5. Miscellaneous: - Unilateral VC paralysis.
- Laryngeal oedema.
- Crico-arytenoid joint arthritis.
- Hysterical.

Tracheostomy

Making surgical opening in the cervical trachea.

Tracheostomy

Indications:

[I] Upper airway obstruction (Stridor):

Causes: see before.

[II] Lower airway obstruction:

In cases of depressed cough reflex when the patient cannot expectorate (the chest is filled with secretion).

Causes:

1. Prolonged coma: due to
a. Traumatic: head trauma or car accident.
b. Inflammatory: meningitis or encephalitis.
c. Toxic:
   - Endogenous: diabetes and uraemia.
   - Exogenous: barbiturate.
d. Vascular: cerebrovascular stroke.
e. Neoplastic: brain tumour.
2. Paralysis of respiratory muscles:
   - Poliomyelitis.
   - Diphtheria.
   - Myasthenia gravis.
3. Severe chest injuries:
   Multiple fractures of ribs.

[III] Part of another operation (Elective): during the following operations

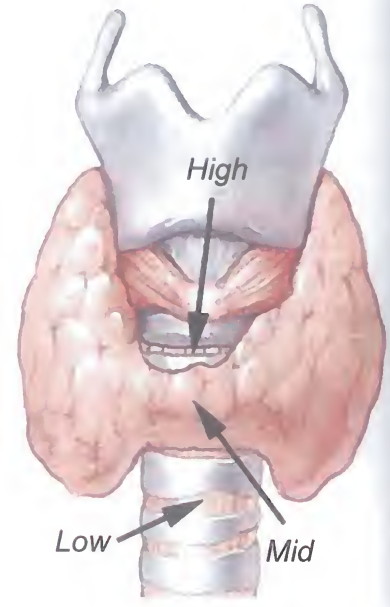
- Large angiofibroma.
- Large cancer tongue.
- Large cancer maxilla.
- Laryngofissure.
- Partial laryngectomy.

} Temporary tracheostomy to avoid aspiration of blood

- Total laryngectomy: Permanent tracheostomy.

Value of tracheostomy:

1) To by pass obstruction.
2) Aspiration of chest secretion.
3) To decrease dead space to its half (half=75 cc).
4) To give humidified O_2.



Types of tracheostomy:

1) High: opening above thyroid isthmus i.e. in 1st and 2nd tracheal rings (Near the cricoid, so it is not preferred).

2) Low: opening below thyroid isthmus i.e. in 5th and 6th tracheal rings (Near thoracic inlet structure, so it is not preferred).

3) Mid: opening behind thyroid isthmus i.e. in 3rd and 4th tracheal rings (It is the operation of choice).

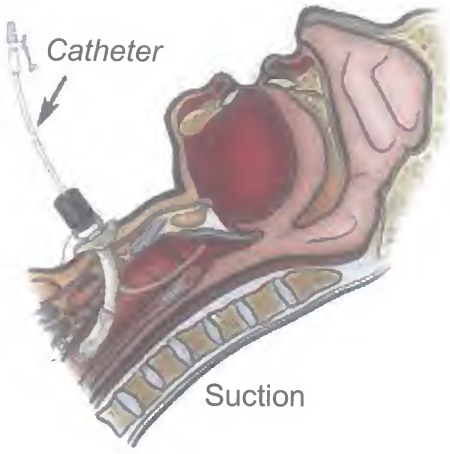
Technique:

- ***Anaesthesia:***
  * Without anaesthesia: in urgent cases.
  * Local anaesthesia: in most cases (Xylocain in adrenaline).
  * General anaesthesia: if the operation was elective.
- ***Position:*** supine with the head extended.
- ***Incision:*** vertical or transverse between cricoid and supra-sternal notch.
- ***Separation*** of pretracheal (Strap) muscles.
- ***Transfixion*** of thyroid isthmus by 2 Kochers.
- Inject xylocain in the trachea to depress the cough reflex before opening of the trachea.
- ***Open*** the trachea with removal of circular portion equal to the diameter of tracheostomy tube to avoid surgical emphysema.
- ***Insertion*** of the tracheostomy tube.
- ***Closure*** of the wound.


Tracheostomy opening

Post-operative care:

1- Position: semi sitting to facilitate cough.
2- Observation of respiration, obstruction is indicated by:
   - Noise reappears (stridor).
   - Voice reappears (speaking).
   - Air is not felt through tracheostomy opening.
3- Observation of bleeding.
4- Antibiotics.
5- Analgesics.
6- Feeding: after few hours.
7- Cleaning of tube and suction from it.
8- Extubation:
- After treatment of the indication.
- Sometimes, tracheostomy may be permanent as after total laryngectomy.
- Extubation should be done gradually i.e. the tube is closed with cork by day and removed by night for 2 days, if no problem → tracheostomy tube can be removed.



Complications: SHIRIF

1) Shock: anaphylactic shock from local anaesthesia.

2) Haemorrhage: it may be

a. Primary: during the operation may be due to bleeding disorders or vessel injury, treated by ligation or diathermy.

b. Reactionary: within 24 hours from operation, may be due to elevation of blood pressure (normalization) during recovery from anaesthesia.
If severe, it should be treated by reanaesthesia then ligation or diathermy of bleeding vessels.

c. Secondary: within 10 days from the operation, it is due to 2ry infection.
Treated by antibiotics and sedative (diazepam) and in severe cases we can ligate the bleeding vessel away from the wound.

3) Injury: to
- Cricoid cartilage (above): leads to porichondritis → necrosis → stenosis (subglottic).

- Apex of pleura (below): leads to pneumothorax.
- Vessels of neck (lateral): leads to haemorrhage.
- Oesophagus (posterior): leads to tracheo-oesopheal fistula

Structure around the trachea

4) Respiratory complications: ASPO

- Apnea: Sudden depression of respiratory centre due to CO_2 wash.
Treatment: by carbogen (95% O_2 + 5% CO_2), or mouth to tube breathing.

- Surgical emphysema: trapping of air in the subcutaneous tissue,
It is due to small tube and wide opening (stoma).
Treatment: by removal of stitches to allow air to pass out.

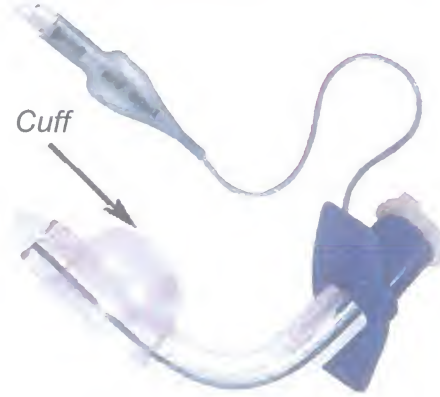
- Pneumothorax: air in the pleural sac (injury to its apex).
Treatment: by under water seal.

- Obstruction: due to either
-Obstruction of the tube: usually by dried mucus.
Treatment: dissolve mucus by sodium bicarbonate and suction
-Slipping of the tube:
Treatment: by insertion of another tube.

5) Infection: either
-Wound infection (local sepsis)
Treatment: by antibiotics and frequent dressings.
-Respiratory infection
Treatment: by antibiotics and frequent suction.

6) Fistula: The opening remains without healing after removal of tracheostomy tube.
Treatment: by removal of fibrosed edge (refreshening) and suturing.

N.B.: Indications of low tracheostomy:
1.Subglottic stenosis as in laryngoscleroma.
2.Subglottic extension of carcinoma.
3.Multiple papillomatosis in children.



Tracheostomy tube

N.B.: Types of tracheostomy tubes:
1-Silastic or metallic tube.
2-With speaking valve or without valve.
3-Cuffed or non-cuffed tube.
4-Single tube or double tube (inner and outer).

N.B. Rapid alternatives for tracheostomy:

One of these methods is indicated in urgent cases if facilities or experience of tracheostomy are not available:

- Endotracheal intubation.

- Percutaneous tracheotomy:
A rigid catheter is introduced between the tracheal rings.

Endotracheal tube

- Laryngostomy (laryngotomy or cricothyroidotomy).

Laryngostomy (Laryngotomy or Cricothyroidotomy)

Making surgical opening in the crico-thyroid membrane.

Indications: Stridor if facilities or experience of tracheostomy are not available.

Laryngofissure

Splitting the thyroid cartilage in the midline to enter the larynx.

Indications:

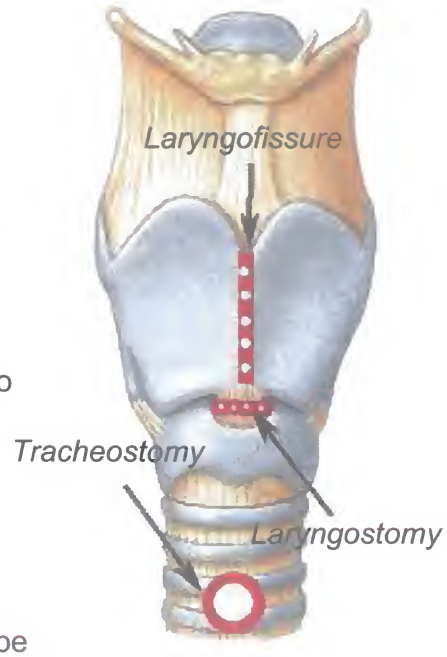
1- Laryngeal stenosis:

When the length of stenotic area is more than 1cm (as Laser gives bad results in thick fibrous tissues).

2- Laryngeal tumour:

- Large benign tumour.
- Small malignant tumour: T_1 glottic carcinoma limited to one VC which is mobile (when Laser is not available).

N.B. Temporary tracheostomy is needed during the procedure of laryngofissure.



Direct laryngoscopy

Direct visualization of the larynx using laryngoscope under general anaesthesia. When we used a microscope to magnify the view, it is called **microlaryngoscopy**. Using it to perform surgical intervention is called **microlaryngosurgery**

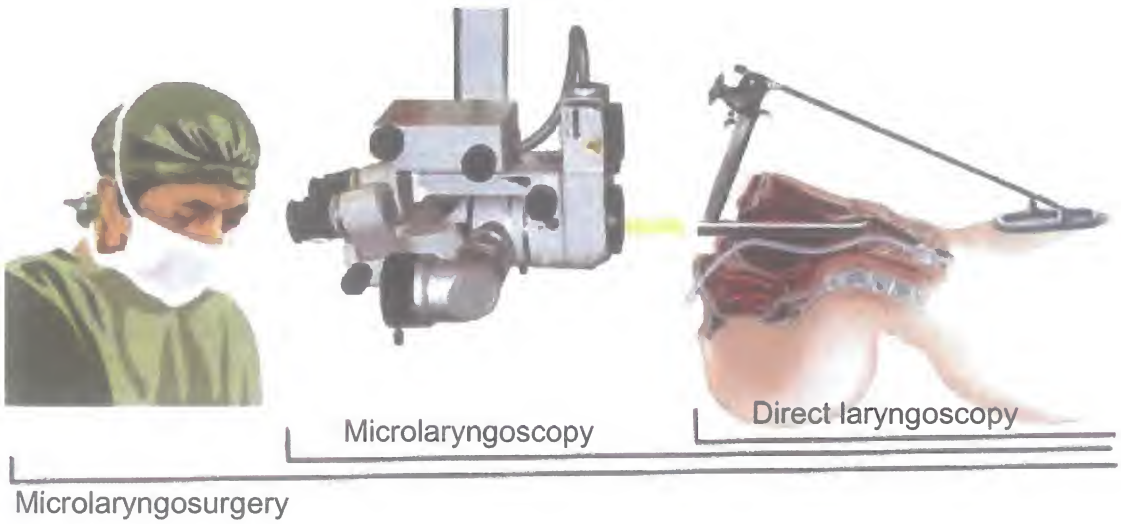
Indications:

1- Diagnostic:

- To examine the larynx when indirect and flexible laryngoscopy is difficult (as in children, and sometimes in adults).
- To assess a laryngeal tumour (**s**ite, **s**ize, extension, VC mobility, **s**hape, **c**hink) and to take a biopsy.

2- Therapeutic:

- To remove foreign body from the larynx.
- All uses of microlaryngosurgery (mentioned in Laser uses in larynx).



LASER in ENT

Light **A**mplification by **S**timulated **E**mission of **R**adiation.

Characters:

- Laser contains only one wavelength.
- All parallel in one phase (coherent).

Mechanism of action:

Evaporation of water contents, i.e. burning, act as scalpel but haemostatic.

Types of laser:

- CO_2 laser:

It is the most commonly used in ENT.

• Invisible beam (carried on another red light).

Advantages: Less bleeding than the conventional surgery.

Disadvantages:

- It can't be transmitted by fibroptic system.
- It can't seal blood vessel more than 0.5ml in diameter.

- Argon: visible (blue green).

- KTP (potassium titanyl phosphate): visible (green).

- Nd/YAG (neodymium yttrium aluminium garnate): invisible.

Laser system

Uses of Laser in ENT:

(1) In mouth and pharynx:

* ***LAUP:*** For treatment of snoring due to large uvula, soft palate and tonsils.

Advantages: - Short stay in hospital.
- Can be done under local anaesthesia.

* ***Tonsilectomy.***
* ***Lingual tonsillectomy.***
* ***Partial (midline) glossectomy in OSA*** (see snoring).
* ***Removal of vascular lesions.***

(2) In Larynx:

* ***Congenital:*** **Web**, laryngomalacia, cyst, stenosis, and hemangioma.
* ***Traumatic:*** Subglottic stenosis (chronic).
* ***Inflammatory:*** - Chronic non-specific localised: Nodule, Polyp, Leukoplakia.
  - Chronic non-specific diffuse: chronic laryngitis (stripping).
  - Chronic specific: **laryngoscleroma** (subglottic stenosis).
* ***Neoplastic:*** - Benign: Multiple **papillomatosis** of children.
  - Malignant: T_1 glottic Ca.
    Large cancer to open the airway (debulking).
* ***Miscellaneous:*** Bilateral VC paralysis (**arytenoidectomy** ± posterior cordectomy).

(3) In nose:

* ***Turbinectomy:***

It can be done under local anaesthesia without tight nasal back and less bleeding.

* ***Removal of vascular lesions.***
* ***DCR (DacryoCystoRhinostomy)***

(4) In Ear:

* ***Removal of auricular lesions*** e.g. haemangioma.
* ***Laser myringotomy.***
* ***Laser stapedotomy:*** perforation of fixed footplate of the stapes to place the piston.

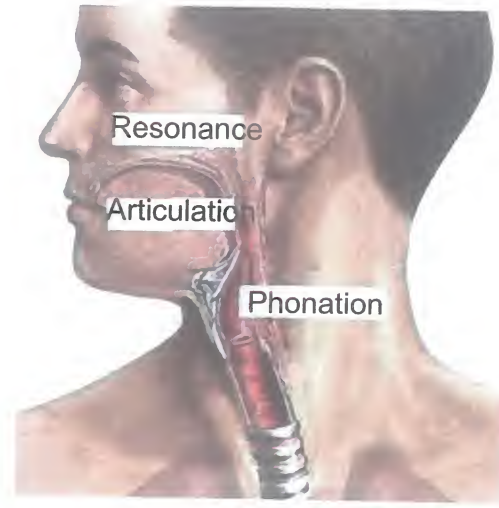
Phoniatrics

It is the science that deals with phonation, speech and language.

Phonation: Is the voice production by the larynx i.e. vibration of the adducted tense vocal cords by the expired air.

Speech: Is the articulation of voice (phonation) into words by the movements of tongue, palate and lips.

Language: Is the method of human communication, it has four modalities: comprehension, Speaking, Reading and Writing. All the above need normal CNS function.



Defects in Phonation (Voice):
Hoarseness or Dysphonia (discussed in symptomatology of the larynx).

Defects in Resonance:
Rhinolalia clausa (in bilateral nasal obstruction).
Rhinolalia aperta (in cleft palate).

Defects in Articulation:
Dysarthria.
Dyslalia.
Echolalia.
Stuttering.

Defects in Language:
Delayed speech development.
Aphasia.

Defects in Resonance:
Problem in pharynx, mouth or nose

1. Hyponasality (Rhinolalia clausa):
- Decreased nasal tone of voice.
- Inability to produce the letters (N, M and Ng); obstruction of voice flow through nose.
- Caused by bilateral nasal obstruction (e.g. adenoid).

2.Hypernasality (Rhinolalia aperta):
- Increased nasal tone of voice.
- Inability to produce most letters (K, P, D); escape of voice flow through the nose.
- Caused by velopharyngeal incompetence (as cleft palate).

Defects in Speech (Articulation):
It is due to defects in the muscles of articulations (tongue, palate and lips), their nerve supply (5^{th}, 7^{th}, 10^{th} and 12^{th} cranial nerves) or the CNS.

1. Dysarthria: Difficult articulation of speech.

a) Slurred speech: defect in labial (B) and dental (F) letters.
It is caused by lesions in pyramidal tract or nerve supply of muscles.

b) Staccato speech: interrupted and explosive syllables.
It is caused by lesion in the cerebellum (co-ordination).

c) Monotonous speech: Expressionless speech.
It is caused by lesion in the extrapyramidal tract.

2. Dyslalia: Improper articulation of speech.
i.e. certain letters pronounced in abnormal manner as S→th and R→gh.
Caused by defects in articulation muscles or functional defects without organic lesion.

3. Echolalia: repeatition of the last syllables that the patient hears.

4. Stuttering: Hesitation during speech and repeatition of syllables.

Defects in Language:

1. Delayed language development:
Lack or delayed development of language before it is fully acquired.
Causes:
1- Motor defect: as brain damage.
2- Sensory defect: i.e. sensory deprivation as hearing or visual impairment.
3- Psychiatric defect.
4- Environmental defect (defect of learning).

2. Aphasia:
Loss of language ability after it has been acquired.
Causes:
Lesions in the speech center in the dominant hemisphere (i.e. central)

Assessment of speech and language defects:

1. Otolaryngologic examination by an Otolaryngologist.
2. Audiological evaluation by an Audiologist.
3. Auditory perceptual assessment and language assessment by a Phoniatrician.
4. Neurological evaluation by a Neurologist.
5. Psychiatric evaluation by a Psychiatrist.
6. Radiological evaluation by a Radiologist.

Assessment of phonation (voice) defects:

1- History taking.
2- Examination of the larynx:
- Indirect laryngoscopy.
- Flexible laryngoscopy or rigid Hopkins laryngoscopy.
3- Investigations for the larynx:
- *Direct laryngoscopy.*
- *Stroboscopy:*See VC paralysis.
- *CT (if indicated).*

Flexible laryngoscopy

Neck Swellings

It may be midline or lateral

a. Midline neck swellings:

1- Thyroglossal cyst.
2- Dermoid cyst.
3- Submental lymph node enlargement.
4- Lingual thyroid.
5- Subhyoid bursa.
6- Prelaryngeal and pretracheal lymph node enlargement.
7- Thyroid isthmus nodule.
8- Thymus tumour.

b. Lateral neck swellings:

1- Lymph node enlargement.
2- Thyroid swelling.
3- Salivary gland swelling.
4- Branchial cyst.
5- Cystic hygroma.
6- Neurogenic tumour (neurofibroma).
7- Carotid aneurysm (pulsating).
8- Pharyngeal pouch.
9- Laryngocele.

Thyroglossal cyst

- It is the commonest midline neck swelling.
- It can develop at any point in the thyroglossal duct, which descends from foramen caecum of tongue base downwards in front, behind or through the hyoid bone to form the thyroid isthmus (the commonest site is infra-hyoid).

Clinical picture:
Cystic swelling in midline, which moves up with deglutition and protrusion of tongue.

Thyroglossal cyst

Complications:
Thyroglossal fistula due to rupture of infected cyst or incomplete removal of the cyst (i.e. the fistula is acquired, never congenital).

Treatment:
Sistrunk's operation in which:
The cyst is removed and the thyroglossal tract with the middle part of hyoid bone and central core of the tongue base are removed (leaving residuals lead to recurrence of cyst or even fistula).

Lingual thyroid

Lingual thyroid

- Caused by failure of thyroglossal duct to descend.

Clinical picture:
Swelling at the tongue base (at foramen caecum), may enlarge to cause dysphagia and respiratory obstruction.

Lymph node enlargement

It may be inflammatory or neoplastic.

a) Inflammatory:

Acute specific:

As in diphtheria and vincent's angina.

Acute non-specific:

As in acute tonsillitis and pharyngitis

Chronic specific:

As in T.B. and syphilis.

Chronic non-specific:

As in dental caries and chronic tonsillitis.

Systemic infections (causing generalized lymphadenopathy)***:***

As in Infectious mononucleosis, Brucellosis, Toxoplasmosis and AIDS.

Enlarged jugulogiagastric lymph nodes

N.B.: Acute lymphadenitis: *The lymph nodes are enlarged, firm and tender with infection in the area drained by these nodes.*

N.B.: Persistent lymph node enlargement *(especially if painless) for more than a month → T.B. or malignancy should be suspected.*

b) Neoplastic:

- 1ry malignant tumour: lymphoma.
- 2ry malignant tumour: metastasis.
- Leukaemia.

Thyroid gland

Embryology:

-The middle part (isthmus):
It develops from thyroglossal duct (descends from the foramen cecum of the tongue).

-The lateral parts (lobes):
They develop from ultimobranchial body of the 4th branchial arch.

-The para-follicular c-cells develop from the neural crest.

Goitre:

Enlarged thyroid that presents as a swelling in the lower part of the front of the neck, moves up and down with deglutition and dose not move with protrusion of the tongue.

- Pathogenesis: ↓ Iodine →↓ T_3 and T_4 synthesis →↑ TSH →↑ Thyroid gland size.

- Types:

**** Physiological goitre:***

- It is caused by iodine deficiency especially at the time of endocrinal stress as at puberty, pregnancy and lactation. The patient is euthyroid.
- The condition is usually reversible, corrected by iodized salts.

**** Colloid goitre:***

-It may follow physiological goiter due to prolonged iodine deficiency, the patient is euthyroid.

-The thyroid is diffusely enlarged (butterfly in shape) with smooth surface.

**** Simple nodular goitre:***

-It is caused by repeated cycles of iodine deficiency and incomplete correction leading to multi-nodularity, the patient is euthyroid.

-The thyroid is enlarged and shows multiple nodules, which are firm and not tender.

** Toxic goitre:* ***either***

Primary thyrotoxicosis (Grave's disease):

Autoimmune disease due to the presence of LATS (long acting thyroid stimulator).

Secondary thyrotoxicosis (Plummer's disease):

Toxic nodular goitre (↑ activity in simple nodular goitre).

In both types, the patient shows manifestations of hyperthyroidism.

N.B.: Retrosternal goitre:

- Presence of goitre behind the sternum (Intra-thoracic).
- Caused by -ve intrathoracic pressure leading to descent of goitre.
- It may lead to: dyspnea, dysphagia and congested neck veins.

Tumours of the thyroid gland:

Benign: Follicular adenoma.

Malignant:

Differentiated (papillary and follicular carcinoma).
Undifferentiated (anaplastic carcinoma).
Medullary carcinoma.
Lymphoma.

Branchial cyst

Cystic swelling at the anterior border of upper third of sternomastoid.

It is formed of remnants of 2nd branchial arch.

Branchial fistula: may be

* Acquired: due to rupture of infected branchial cyst, or incomplete removal.

* Congenital: present along the anterior border of lower third of sternomastoid.

Treatment:

Surgical removal (care is taken as the the tract may pass through carotid bifurcation to the pharynx).

Cystic hygroma

Cystic swelling in the posterior triangle of the neck. A lymphatic malformation, formed of lymphoid tissues.

It is due to persistence of the primitive lymph sac.

Salivary glands

There are major (parotid, submandibular, and sublingual) and minor glands.

Parotid gland:

- Present below and infornt of the auricle.
- The facial nerve passes through its tissue, dividing it into superficial and deep lobes.
- The deep lobe present lateral to the parapharyngeal space.
- Its Stenson's duct opens in the oral cavity (opposite upper 2nd molar tooth).

Submandibular gland:

- Present between the body of the mandible and mylohyoid muscle.
- Its Wharton's duct opens into the floor of the mouth.
- The mandibular branch of facial nerve present in the deep fascia overlying the gland.

-The deep part of the gland related superiorly to lingual nerve and inferiorly to hypoglossal nerve.

A) Inflammatory:

Sialadenitis: Inflammation of salivary glands.

Causes:

- Retrograde infection from oral cavity.
- Blood borne infection: bacterial or viral (mumps).

Clinical picture:

Symptoms:

Painful swelling below the ear or in submandibular region.

Sings:

Tender swelling (site?), becomes fluctuant if suppurated.

Pus coming from the duct on squeezing.

Treatment:

- Complete bed rest + plenty of warm fluids.
- Systemic antibiotics + Analgesic, antipyretics.
- Incision and drainage if suppuration occurred (to avoid injury of facial nerve in the parotid, the skin incision is taken vertically for cosmoses and the parotid fascia is opened transversely i.e parallel to the nerve fibers).

Salivary stones (calculi):

It is more common in the submandibular than in the parotid as:

1-The submandibular secretion is viscid while parotid secretion is watery.

2-The submandibular drainage is against the gravity.

Difference between submandibular salivary gland and submandibular LNs

Submandibular salivary gland	Submandibular lymph nodes
Solitary	Multiple
Cannot be rolled over the lower border of the mandible (deep).	Can be rolled over the lower border of the mandible (superficial).
Better felt from oral cavity (Bimanually)	Better felt from outside (superficial).

B) Neoplastic:

Site:

Parotid gland: the commonest (80%), followed by submandibular gland (10%) and sublingual and minor gland (10%).

Types:

1-Benign: more common.

- Pleomorphic adenoma (mixed salivary): the commonest.
- Warthin's tumour: Adenolymphoma
- Lymphangioma and Haemangioma.

2-Malignant tumour:

Characterized by rapid growth, pain (earache), hardeness (fixation), and facial paralysis.

- Adenoid cystic carcinoma: The commonest.
- Mucoepidermoid carcinoma.
- Adenocarcinoma.
- Carcinoma ex pleomorphic adenoma.
- Lymphoma.

Parotid swelling

Treatment:

* Parotid tumour:

Benign: Superficial parotidectomy (in superficial lobe) or total parotidectomy (in deep lobe) with conservation of facial nerve.

Malignant: Total parotidectomy with sacrification of facial nerve and RND.

* Submandibular gland tumour: Complete removal of the gland (sialadenectomy).
* Sublingual and minor salivary glands tumour: complete removal.

Clinical ENT

Be patient to treat your patient

General Sheet

History taking

(1) Personal history:

1- Name: To be familiar with the patient.

2- Age:
- Young: - Congenital diseases
  - Angiofibroma.
- Old: - Cancer.
  - Senile disease.

3- Sex:
- Male: - Angiofibroma only in males.
  - Cancers are more common in males.
- Female: - Otosclerosis is more common.
  - Atrophic rhinitis is more common.

4- Marital Status.

5- Occupation:
- Noise ➔ SNHL (sensorineural hearing loss)
- Pollution ➔ Rhinosinusitis.

6- Residence: e.g. Rhinoscleroma is more common in Sharkya of Egypt.

7- Special habits:
- Smoking ➔ Chronic laryngitis, Pharyngitis and Sinusitis and Cancer larynx.
- Alcohol ➔ Cancer Larynx and Hypopharynx.

N.B.: All these points should be written in a single paragraph.

(2) Complaint:

- The patient's own wards.
- Do not use medical terms.

(3) Present history:

1- Onset, course and duration of the complaint (OCD).
2- Symptoms of the same organ.
3- Symptoms of other ENT organs.
4- General symptoms: Fever - Rigors - Vomiting.

*N.B.: **OCD** is the analysis of the complaint.*

- **O**nset:
  - Sudden ➔ Traumatic or vascular.
  - Acute ➔ Acute inflammation.
  - Gradual ➔ Chronic inflammation or tumour.
- **C**ourse:
  - Progressive
  - Regressive
  - Stationary
  - Intermittent or fluctuant.
- **D**uration: e.g. the complaint started one month ago.

Every organ in ENT has 10 symptoms, you should ask about in the present history.

(4) Past history:

- Past history of ***diseases*** of the affected organ.
- Past history of ***trauma.***
- Past history of ***operations.***
- Past history of ***medications*** (related to the diseased organ).
- Past history of ***other ENT*** organs.
- ***General diseases*** as: Hypertension, Diabetes, Syphilis, T.B., other medical problems as chest or heart diseases.

(5) Family history:

- ***Consanguinity***: increases the incidence of congenital diseases.
- ***Similar condition*** in the family (familial diseases).

▪ ***General diseases***: as diabetes or hypertension.

Examples of familial diseases:

Otosclerosis: +ve family history in about 50% of cases.

Allergic rhinitis: +ve family history in about 50% of cases.

Examination

1- General.

2- Local: ***a) Diseased organ.***

b) Other ENT organs.

N.B. General examination includes:

- Pulse.
- Temperature.
- Blood Pressure.
- Respiratory Rate.
- General condition.

(The general condition in normal subject = the patient is alert, conscious, co-operative, well oriented for time and place and he is of average intelligence).

N.B. General rules:

- Facial nerve examination is a part of Ear examination.
- Orbit examination is a part of nose examination.
- Neck examination is a part of throat examination.
- Cranial nerves examination may be needed if your case has cranial nerve palsies or certain cases.

Ear

History taking

- Personal history: As before.

- Complaint:

▪ Patient's own wards.

▪ Don't use medical terms.

▪ Right or Left or Bilateral.

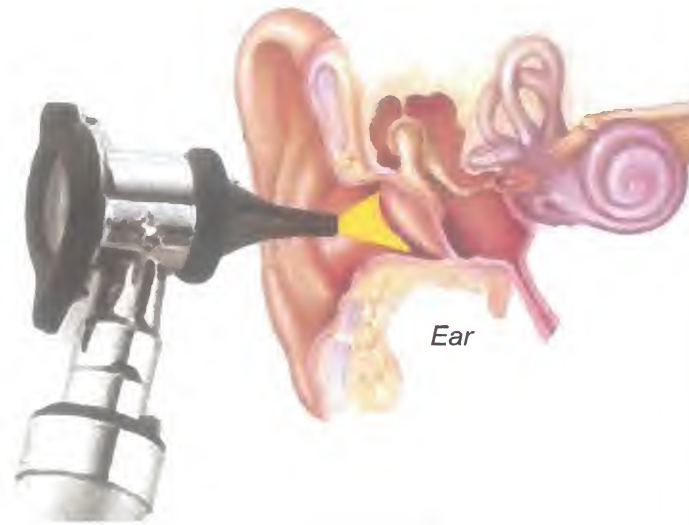
- Present history: Ask about

♦ OCD of the complaint.

♦ Ear symptoms

♦ Other ENT symptoms: briefly.

♦ General symptoms.



Otoscope Otoscopy

Ear Symptoms:

(1) Deafness: Diminution of hearing.

Bilateral or unilateral (Rt. or Lt.)

(2) Tinnitus: Noise in the ear.

Bilateral or unilateral (Rt. or Lt.).

Character of tinnitus: The most important is the pulsatile tinnitus occurring in vascular lesions as: Glomus tumour, high Jugular bulb and carotid aneurysm.

(3) Discharge:

Bilateral or unilateral (Rt. or Lt.).

Comment on:
- Amount.
- Colour.
- Odour.
- Consistency.

N.B.: *You should differentiate between AOM and CSOM.*
AOM has a short duration and the discharge is mucopurulent.
CSOM has a long duration and the discharge is:
In safe CSOM: intermittent, odourless, profuse, and mucopurulent.
In unsafe CSOM: persistent, offensive, scanty, and purulent.
(4) Earache: Site, severity, precipitating factors, relieving factors and radiation.
N.B.: CSOM is never painful except in:
1- Complication.
2- Acute exacerbation.
3- Very rare, neoplastic changes.
(5) Headache: Site, severity, precipitating factors and relieving factors.
(6) Vertigo: false sensation of rotation.
(7) Facial paralysis:
- Deviation of mouth (to the healthy side).
- Inability to close the eye (on paralysed side).
- Accumulation of food behind the cheek (on paralysed side).

(8) Swelling.
(9) Deformity.
(10) Eye symptoms: Vision - Diplopia.
N.B.: *Eye symptoms may be present in complicated otitis media.*

- Past history:
- Ear diseases.
- Trauma: Physical (Noise and explosion)
Mechanical (Fracture base of skull).
- Operations.
- Medications: especially Ototoxic drugs.

N.B.: **Ototoxic drugs such as:**
. *Aminoglycosides* as Neomycin, Garamycin, Gentamycin, Streptomycin.
. *Diuretics* as Frusemide
. *Salicylates* in large doses
. *Quinine.*
. *Chemotherapy* as Cisplatin
- Previous ENT diseases.
- General diseases: as before.
- Family History: as before.


Otoscope

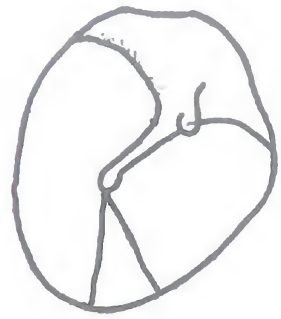

Otoendoscope

Examination
- General: as before.
- Local:
Ears (Both).
Other ENT organs: briefly.

N.B.
- The facial nerve should be examined.
- If the case has facial paralysis, you should examine the ear.
- During examination of the external auditory canal (EAC), drum and middle ear (ME) mucosa by otoscope, you should pull the auricle upwards and backwards to straighten the EAC and you should also switch on the light of otoscope before introducing it.
- Both ears should be examined.
- Presence of normal cone of light usually indicates normal drum.
- Metallic cones may be used to facilitate cleaning and suction of the ear.
- Otoendoscope and even microscope is sometimes used for better vision.

Ear examination (form):

	Right	Left
Auricle	..... (Deformity or swelling)	
Pre-auricular	..... (Cyst, fistula, scar or tenderness)	
Post-auricular	..... (Scar, swelling, fistula, tenderness)	
Ext. auditory canal	..... (Wax, otomycosis, discharge, polyp).....	
Tympanic membrane		



Draw the perforation if present, if not seen → write not seen (obscured by wax, discharge or others), postgraduate doctor should clean the canal to see the drum.

Middle ear mucosa (Pale dry, congested, granulations, polyoid or covered with discharge).

Fistula sign ..... (+ve or - ve) .....

Tuning fork tests:

Rinne ..... (+ve or - ve) .....

Weber .....(lateralised to which side or central) .....

N.B.: Comment on the facial nerve, if normal you have to say → No abnormality.

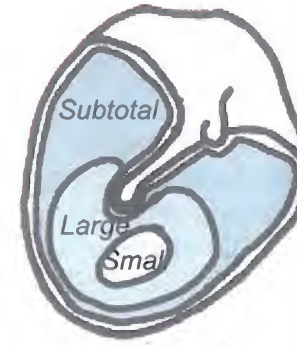
N.B: Fistula sign: Pressure on the tragus leads to vertigo and nystagmus in +ve cases.

Types of perforations:

Central:

The perforation is surrounded by rim of the drum all round i.e. not reaching to the annulus.

In: - Safe CSOM.
- AOM
- Traumatic perforation.



Safe CSOM

Marginal:

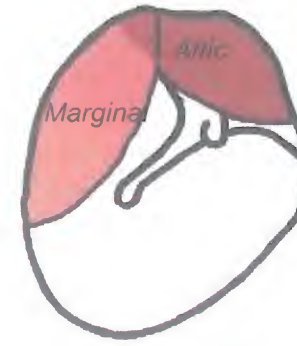
The perforation is not surrounded by rim of the drum all round i.e. reaching to the annulus.

In: - Unsafe CSOM.

Attic:

The perforation in the pars flaccida i.e. in the most upper part of the drum.

In: - Unsafe CSOM (attic cholesteatoma).



Unsafe CSOM

Tender points of the ear

Auricle: perichondritis.
Tragus: otitis externa.
Mastoid: mastoiditis (over the tip, antrum, and posterior border).

Examination of the Cranial Nerves:

♣ **1st (Olfactory):** Smell

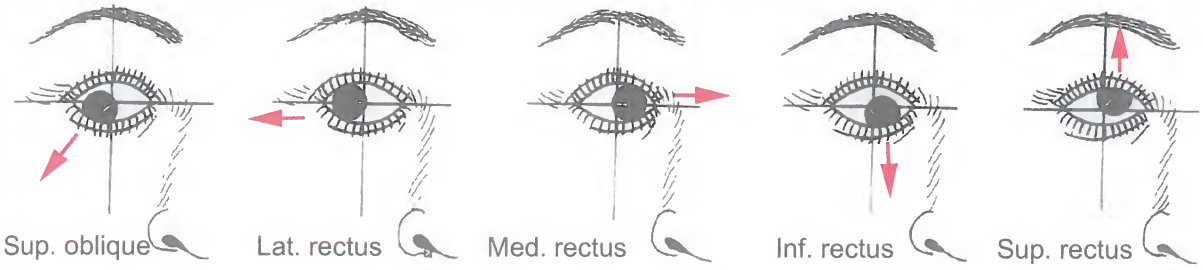
After closure of eyes, every nostril should be examined separately while the other side is closed and the material used for smell should be familiar and non-irritant.

♣ **2nd (Optic):** Vision

- Visual acuity by: Snellen's chart → counting fingers → Hand movements → perception of light.
- Field of vision by confrontation test.

♣ **3rd, 4th and 6th:** Ocular mobility.

- **4th (Trochlear):** Looking at shoulder (By superior oblique muscle).
- **6th (Abducent):** Looking laterally (By lateral rectus muscle).
- **3rd (Oculomotor):** Looking at other directions (By other extra-ocular muscles).



♣ 5th (Trigeminal):

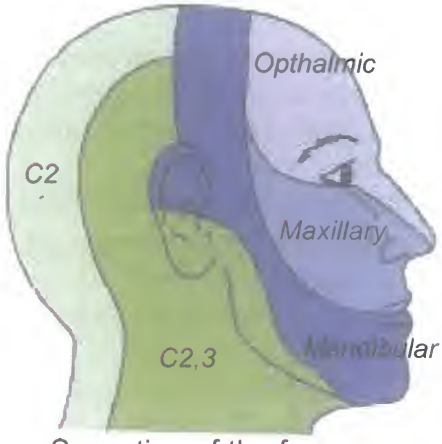
- Sensory part: Ophthalmic
  Maxillary
  Mandibular
- Motor part: Muscles of mastication.

• Examination of sensory part:

Compare the sensation of the face between both sides then with the angle of the mandible (supplied by C2, 3)

• Examination of motor part:

Temporalis & Masseter: by clenching the jaw.
Medial & Lateral pterygoids: by opening the jaw against resistance.



Sensation of the face

♣ 7th (Facial):

- Motor part: Muscles of face and stapedius.
- Secretomotor part: Lacrimal, submandibulr, and sublingual salivary glands.
- Sensory part: Anterior 2/3 of tongue for taste.

Examination of motor part:

a) Inspection:

- Loss of corrugation of forehead on the diseased side.
- Obliteration of nasolabial fold on the diseased side.
- Deviation of angle of mouth to the healthy side.

b) Motor power:

- Forntalis by elevation of eye brows.
- Orbicularis oculi by closure of eyes.
- Retractor anguli by showing the teeth.
- Orbicularis oris and Buccinator by blowing and whistling.

Right facial paralysis

N.B.: You should comment on:
- The paralysis is right or left.
- It is partial (some visible movements) or complete (no movement at all).
- The paralysis is upper motor or lower motor neuron.

	UMNL	LMNL
Paralysis	Lower ½ of face of the opposite side. 	Upper ½ + Lower ½ of face of the same side i.e. total facial paralysis. 
Emotional movement	Present	Absent
Hemiplegia	Present	Absent
Muscle tone	Increased	Decreased

Examination of secretomotor part:

a) Lacrimation by Schirmer's Test

If the difference between both sides exceeds 30% of total → +ve result.

b) Salivation by Salivary flow test


Schirmer's test

Examination of sensory part:

Taste Sensation: from anterior 2/3 of tongue.

N.B.: Stapedial reflex is a test for stapedius muscle function which is:
Loud sound leads to contraction of stapedius resulting in stiffness of the drum

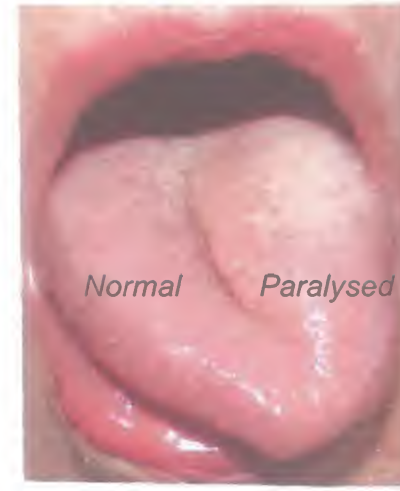
♣ **8th (vestibulo-cochlear):** Hearing + Balance
- Hearing by tuning fork tests.
- Balance by caloric test.

♣ **9th (Glossopharyngeal):** Pharynx + Tongue base
Testing pharyngeal sensation (supratonsillar fossa).

♣ **10th (Vagus):**
- Vocal cord mobility by indirect laryngoscopy (on saying E)
- Palatal mobility by tongue depressor (on saying A)

♣ **11th (Accessory):**
- Sternomastoid (turning the face to opposite side).
- Trapezius (elevation of shoulder).

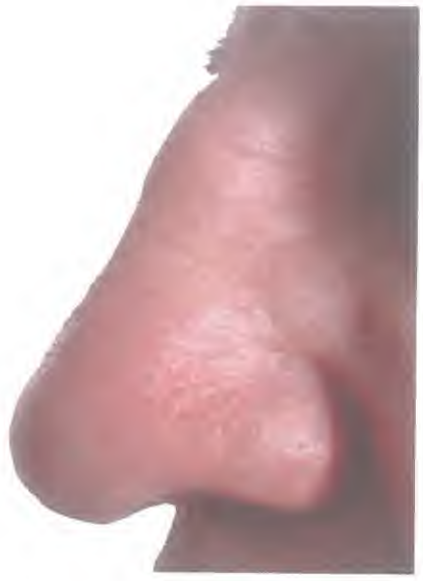
♣ **12th (Hypoglossal):** Tongue muscles.
On protrusion of tongue, it will be deviated to the affected side.



Tongue paralysis

N.B.: In tongue and pterygoid paralysis, the organ will be deviated to the affected side.

Nose



History taking

(1) Personal History: as before.

(2) Complaint: as before.

(3) Present History: ask about

- OCD of the complaint.
- Nasal symptoms.
- Other ENT symptoms: briefly.
- General symptoms.

Nasal Symptoms: 10 + Orbital symptoms.

(1) Nasal obstruction:

- Bilateral or unilateral (Rt. or Lt.).

(2) Nasal discharge:

- Bilateral or unilateral (Rt. or Lt.)
- Comment on:
  - Amount.
  - Colour { Whitish: no infection; Yellowish or Greenish: infection.
  - Odour { Offensive: infection; Odourless: no infection
  - Consistency { Purulent. Mucopurulent. Watery Crusty

N.B.: *Differential diagnosis of offensive nasal discharge:*

- Sinusitis of dental origin.
- FB in the nose.
- Atrophic rhinitis.

(3) Epistaxis:

- Bilateral or unilateral (Rt. or Lt.).
- Severity

If managed by first aid only = mild epistaxis.
If transferred to the hospital = severe epistaxis.

(4) Facial Pain: Site, severity, precipitating factors, relieving factors and radiation.

(5) Headache: Site, severity, precipitating factors, relieving factors and diurnal variation.

N.B.: Characters of headache due to sinusitis:

- More severe in the morning.
- Its site is over the affected sinus.
- Increases by coughing, straining, and leaning forewords.

(6) Smell disorder:

-Anosmia: loss of smell.
-Hyposmia: diminution of smell.
-Cacosmia: sensation of bad smell.
-Parosmia: perverted sense of smell.

(7) Sneezing: recurrent attacks = Allergic rhinitis. If present ask about itching.

(8) Snoring: abnormal noise produced during sleep due to vibration of redundant soft tissues of the oropharynx and/or hypopharynx.

-If present → you should ask about sleep apnea.

(9) Swelling: site, Rt. or Lt.

(10) Deformity: deviation, twist or depression.
+ Orbital symptoms: vision, diplopia, proptosis and epiphora.

(4) Past History:
- Nasal diseases.
- Trauma.
- Operations.
- Medications: especially nasal drops for long period.

N.B.: *Nasal drops for long period lead to rhinitis medicamentosa (chronic hypertrophy of turbinatesdue to persistent vasodilatation).*

- Previous ENT diseases.
- General diseases: as before.

(5) Family History: as before.

Examination:

- General: as before.
- Local:
Nose
Other ENT organs: briefly.

N.B.
- Orbit is a part of nasal examination especially in presence of a tumour or complicated sinusitis.
- If your case has a tumour, you should examine:
- Lymph nodes of the neck.
- The related cranial nerves as trigeminal and ocular nerves.

Tender points in sinusitis

Nose examination (form):

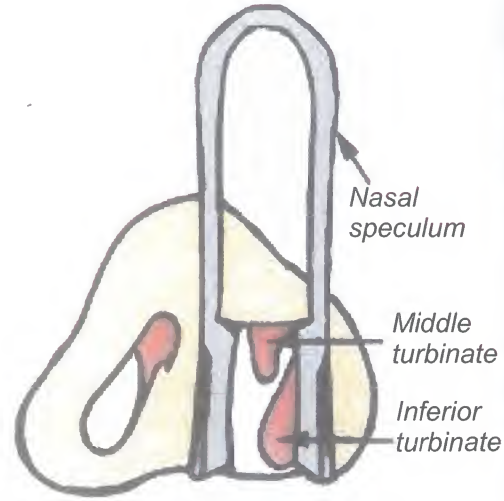
(1) External examination:

Shape.
Airflow.
Palpation: Over the nose (tender in fracture)
Over the sinuses:

N.B.
Frontal sinus: Over the forehead (anterior wall).
Above the medial half of eye (floor)
Ethmoid sinus: Over the inner canthus.
Maxillarys sinus: Over the cheek.

(2) Anterior rhinoscopy:

Using the nasal speculum and headlight.
5 areas will be seen: vestibule, nasal cavity, septum, lateral wall (turbinates) and floor
If there is a mass or a polyp, you should describe it.



Anterior rhinoscopy

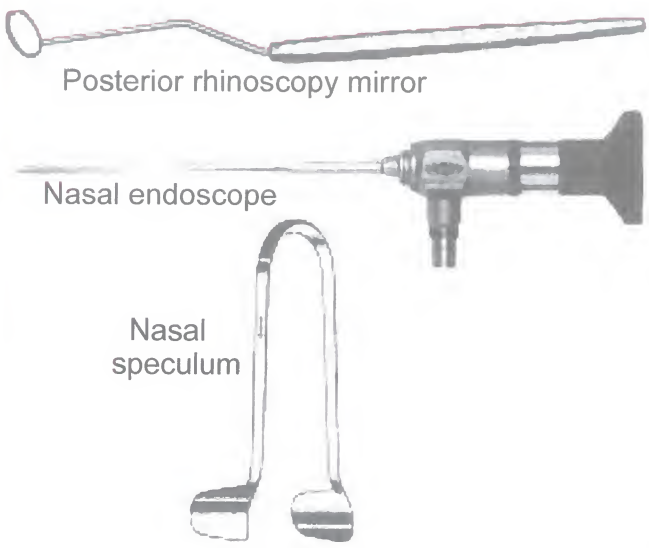
N.B. Differential diagnosis of unilateral nasal mass:
1- Antro-choanal polyp.
2- Angiofibroma.
3- Tumour.
4- Allergic fungal sinusitis.

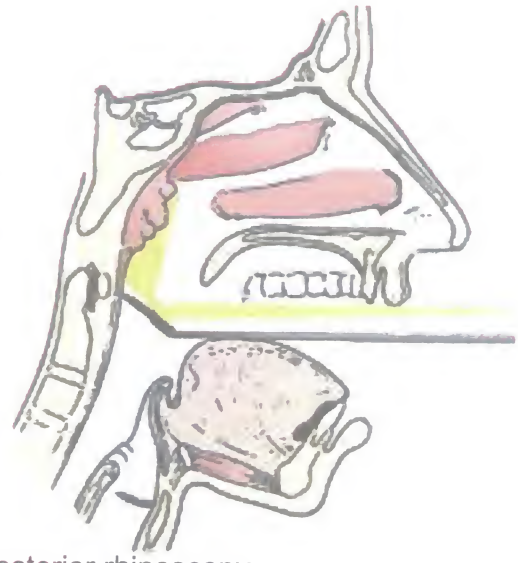
N.B. Differentiation of a polyp from hypertrophied turbinate:
1- We can introduce a probe to turn all round the polyp.
2- The polyp is insensitive to touch.
3- The polyp is soft, mobile, glistening and grayish white in colour.

(3) Posterior rhinoscopy and digital Palpation:

Using posterior rhinoscopy mirror and headlight while digital palpation done by the index finger.

N.B. Not longer used as it causes discomfort to the patient, replaced by nasal endoscopy.





Posterior rhinoscopy

(4) Nasal endoscopy:

It shows the entire nasal cavity, and nasopharynx. Biopsy can be taken from nasal and nasopharyngeal tumours.

Nasal endoscopy

(5) Orbital examination:

We look for:

- Proptosis: protrusion of eyeball
    - Frontal swelling pushes the eyeball downwards and laterally.
    - Ethmoidal swelling pushes the eyeball laterally.
    - Maxillary swelling pushes the eyeball upwards.
- Vision: Acuity of vision + Field of vision.
- Mobility: to test the ocular nerves 3rd, 4th, and 6th.

Throat

History taking

(1) Personal History: as before.

(2) Complaint: as before.

(3) Present History: ask about

- OCD of the complaint.
- Throat symptoms (pharynx + larynx).
- Other ENT symptoms: briefly.
- General symptoms.

Throat Symptoms: 10

1) Change of voice (Hoarseness):
2) Difficulty of breathing (Stridor):
3) Difficulty of swallowing (Dysphagia):
Either to solids or to fluids or to both.

N.B.:

• Hoarseness, Stridor and Dysphagia (medical terms) can be written in the present history as such. But in the Complaint:

- Hoarseness = Change of voice.
- Stridor = Difficulty of breathing.
- Dysphagia = Difficulty of swallowing.

4) Chocking: may be present in:

- Vocal cord paralysis (10^{th}).
- Obstruction of salivary flow (Cancer hypopharynx).
- Loss of pharyngeal sensation (9^{th}).

5) Regurgitation: may be present in pharyngeal Pouch and Achalasia.

6) Pain: Site, severity, precipitating factors, relieving factors and radiation.

• Laryngeal and hypopharyngeal pain → Referred to the ear through Arnold's branch of vagus nerve.

• Pharyngeal pain → referred to the ear through Jacobson's branch of glossopharyngeal nerve.

7) Cough, expectoration and haemoptysis.
8) Neck swelling
9) Loss of Weight
10) Distant metastasis

N.B. *Sites of distant metastasis are: LLBB (Lung, Liver, Bone and Brain).*

(4) Past History: as before.

(5) Family History: as before

Examination:

General: as before +

Comment on:

Pallor: Present in anaemia as in Angiofibroma (due to epistaxis) and in Plummer-Vinson syndrome (post-cricoid carcinoma)

Jaundice: Present in liver metastasis.

Cyanosis: Present in severe stridor.

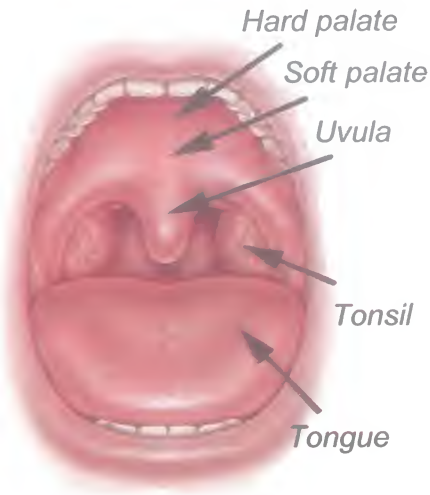
- Local: **Pharynx and Larynx (Throat)**
Other ENT organs: briefly.

N.B. *Neck examination should be done in every case.*

Throat examination (form):

1) Oral cavity and oropharynx:

Describe the abnormality.
By tongue depressor over the tongue and headlight directed to the mouth while the patient saying Ah.
We can see the following:
- Gum and teeth.
- Oral mucosa and salivary ducts.
- Floor of mouth.
- Tongue.
- Palate.
- Oropharynx (Tonsils).



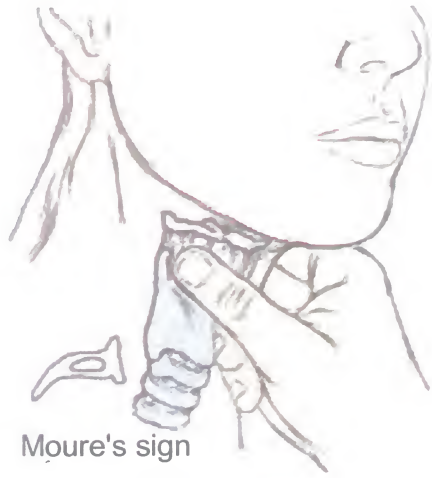
2) Hypophyarynx and Larynx:

a- External examination:

* **Inspection:** for scar, fistula or sinuses, abnormal pigmentation, dilated veins and the movement of larynx up and down with deglutition.

* **Palpation:** for
- Tenderness (present in laryngeal perichondritis and trauma)
- Crepitus (present in laryngeal trauma)

* **Moure's sign:** movement of the larynx over the vertebrae causing friction (click).
Absent click (in post-cricoid carcinoma)
Or Preserved click (no postcricoid carcinoma).

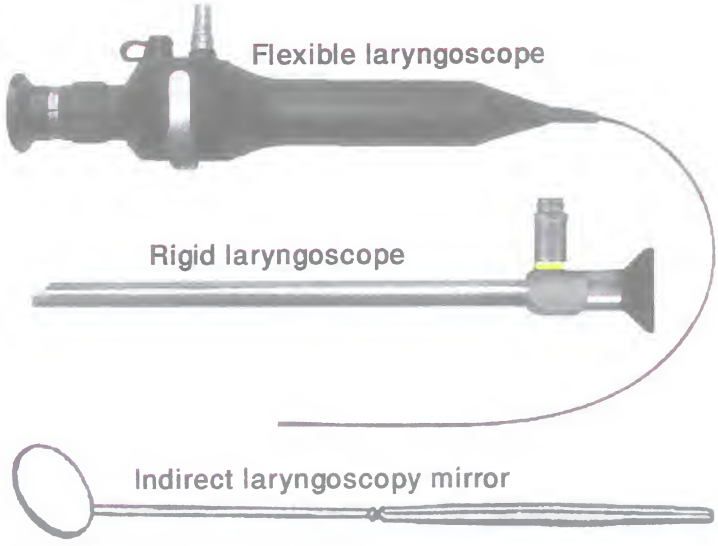

Moure's sign

b- Indirect Laryngoscopy:

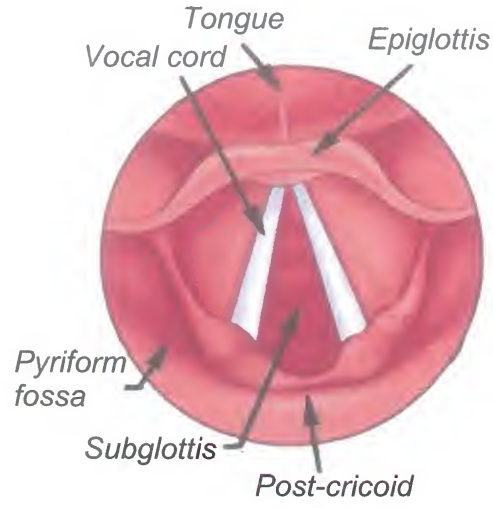
Done by laryngeal mirror, which is warmed before using to prevent condensation of vapour on it during respiration, it shows any pathology of the larynx and also vocal cord mobility on saying (E).
N.B.: If exagerrated gag reflex → oral Xylocaine spray (local anaesthetic) is used.

c- Flexible or rigid laryngoscopy.

The flexible laryngoscope is introduced through the nose, while the rigid is introduced through the mouth (using local anesthesia)



Indirect laryngoscopy



View by indirect laryngoscopy

3) Neck examination:

a- Thyroid gland:

Present in the lower part of the front of the neck, it moves up and down with deglutition and dose not move with protrusion of the tongue.

b- Lymph nodes:

Right or Left

Upper or lower deep cervical nodes.

N.B.: Anatomical classification:

Upper and lower deep cervical lymph nodes separated by superior belly of omohyoid. Jugulodiagastric is a part of the upper group.

N.B.: Surgical classification:

Lymph nodes are arranged in 6 levels:

Level **I**: submental and submandibular.

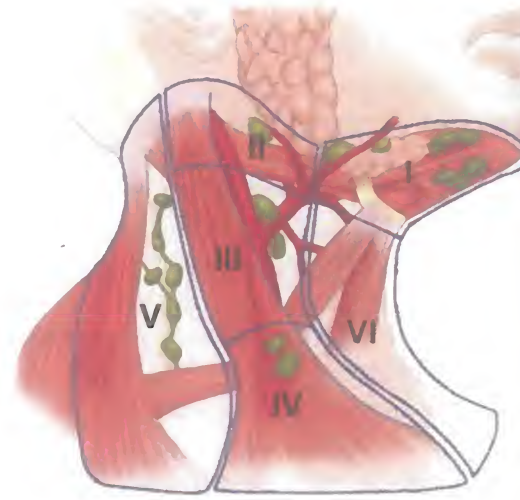
Level **II**: upper jugular.

Level **III**: mid jugular.

Level **IV**: lower jugular.

Level **V**: posterior triangle.

Level **VI**: anterior (midline)



Surgical classification

c- Salivary glands.

d- Fistulae.

e- Swellings: Comment on the following points:

- **S**ite: upper or lower/ Rt. or Lt.
- **S**hape: rounded, oval ... etc.
- **S**urrounding structure.
- Tenderness.
- Mobility.
- Compressibility.
- **S**ize: about ? X ?.
- **S**urface: smooth or nodular.
- Overlying **S**kin.
- Border: well or ill defined.
- Consistency: soft, firm or hard.
- Pulsations.

Quiz (problem solving)

What is the provisional diagnosis for the following cases?

Ear

1. A 30 year old patient presented with right earache for 3 days. The pain increases on mastication. The tragus was tender with a localized swelling in the ear canal on examination.

2. A 30 year old female had itching in her right ear for 3 weeks. 2 days ago, she scratched her right ear vigorously. Now, she has right earache increasing on mastication.

3. A 20 year old female presented with right earache and discharge. She gave history of ear wash 2 days before, she felt pain in her right ear and water coming from the right side of the nose during the ear wash.

4. An old diabetic patient with severe right earache and discharge developed right facial paralysis. Right ear examination revealed granulations in the ear canal with intact normal drum

5. A 25 year old female had an attack of left earache and diminution of hearing together with inability to close the left eye and deviation of mouth to the right side. 4 days later vesicular eruption appeared in the left external auditory meatus and concha of auricle.

6. A 34 year old patient presented with right earache and autophony. The condition is preceded with common cold 2 days earlier. Otoscoy showed congested bulging right drum

7. A 2 year old child spent the last night crying with a high temperature preceded with running nose. In the morning his mother noticed left ear discharge with subsidence of symptoms.

8. A child with a history of repeated upper respiratory tract infections. His teacher reported deterioration in his scores and lack of his concentration in the class.

9. A 5 year old girl presented with diminution of hearing in both ears, the mother stated that her daughter snores loudly by night.

10. A 6 year old boy presented with diminution of hearing. Two months earlier, the boy had an attack of fever and severe bilateral earache following running nose, at that time he received medical treatment which led to subsidence of pain and fever.

11. A 6 year old boy presented with diminution of hearing for 6 months. Otoscopy showed dull retracted both tympanic membranes with reduced mobility.

12. A 25 year old man presented with right ear deafness, tinnitus and intermittent odourless discharge. Right ear examination showed central perforation with normal left ear. Rinne test revealed that air conduction was less than bone conduction in the right ear, while Weber test showed lateralisation of hearing to the right ear.

13. A man with a long history of left ear offensive discharge, developed headache and blurring of vision. Left ear examination showed granulations and discharge.

14. A diabetic patient with a long history of left ear foul discharge developed left facial pain and left convergent squint. Left ear examination showed granulations and discharge.

15. A 3 year old child presented with inability to close the right eye preceded by common cold and right earache. Examination showed intact congested right tympanic membrane.

16. A 15 year old student with a long history of left ear discharge developed persistent fever, headache and neck rigidity. Examination of the ear showed foul discharge and granulations.

17. A 5 year old boy developed fever and right earache followed 2 days later by a painful tender post-auricular swelling. Examination showed right congested tympanic membrane.

18. A 25 year old female with right ear discharge of 7 years duration developed spiking (intermittent) fever and earache. Examination of the neck showed tenderness along the anterior border of the sternomastoid. The right ear showed attic granulations.

19. A 30 year old patient presented with inability to close his left eye with deviation of mouth to the right for 2 days. There was a long history of offensive left ear discharge that increased recently.

20. A 23 year old man presented with bilateral intermittent mucopurulent ear discharge for the last 4 years. 3 days ago, he had an attack of common cold. Otoscopy showed bilateral central perforation with pulsating discharge.

21. A 40 year old woman complained of diminution of hearing and tinnitus in both ears. Otoscopy showed no abnormality in both ears, Rinne test was negative bilaterally and Weber was lateralized to the right side.

22. A 45 year old patient presented with recurrent attacks of vertigo. He also complained of diminution of hearing and tinnitus in right ear. Both ears were normal on otoscopy. Rinne test was positive on both ears, and Weber test showed lateralization to left side.

23. A 35 year old man was a victim to a car accident developed right ear bloody discharge and headache. He was transferred to the hospital, and on the next day he developed right facial paralysis. Otoscopy showed traumatic perforation of the right drum.

24. A 50 year old man presented with deafness and pulsatile tinnitus in his right ear. Examination showed reddish discolouration of right drum and his bone conduction was better than air conduction. His left ear was normal.

25. A 55 year old woman developed deafness and tinnitus in her left ear. Otoscopic examination showed no abnormality in both ears. Audiological study showed moderate to severe SNHL in the left ear with normal hearing in the right ear.

26. A 60 year old man presented with right earache for the last 2 months. He gave long history of right ear deafness, tinnitus and discharge. Examination of the right ear showed reddish mass which bleeds on touch, the patient had facial parlysis and upper deep cervical lymphadenopathy. Also, the lower 4 cranial nerves were paralysed.

27. A 30 year old female presented with inability to close left eye and deviated mouth to right side. The condition was preceded 1 day before by left earache. Examination of both ears showed normal intact tympanic membrane. No history of trauma, operations, or ear discharge. He noticed discomfort on hearing loud sound and metallic taste in the mouth.

28. A 4 year old child with nasal tone of voice complained of diminution of hearing in both ears and nasal regurgitation of fluids. Otoscopy showed dull retracted both drum.

Nose

1. A newborn presented with difficulty of breathing, bilateral nasal discharge and intermittent cyanosis. Examination showed bilateral mucoid nasal discharge and normal larynx.

2. A 3 year old child with left nasal obstruction and offensive discharge for a week.

3. A 35 year old man was a victim to a car accident developed right nasal watery discharge and headache. Examination of the nose showed no abnormality.

4. A 45 year old diabetic woman presented with left nasal offensive discharge, pain over the left side of the face and regurgitation of fluid for a week. She gave history of extraction of one of her teeth on the same side.

5. A 20 year old male presented with a rapidly developing bilateral nasal obstruction following facial trauma. On examination, there was bilateral soft reddish swelling on both sides of nasal septum with complete obstruction of both nasal cavities

6. A 45 year old female presented with right facial pain, she gave history of dental pain on right upper jaw. Her nasal discharge was offensive and right cheek was tender.

7. A 50 year old diabetic patient presented with small paiful tender swelling in the left nostril. The condition was repeated 3 times through the last year.

8. A 30 year old female presented with severe stridor that necessitates tracheostomy. Examination of her nose showed bilateral nasal crustations (and/or masses).

9. A 38 year old female presented with bilateral nasal crusty discharge and loss of smell. Examination showed wide both nasal cavities with foul crusts.

10. An old diabetic female developed facial pain and headache with bilateral nasal obstruction, offensive discharge and proptosis of right eye followed by blindness.

11. A 50 year old female presented with right eye proptosis, oedema of eyelid, pain, and progressive visual deterioration. She gave history of recurrent attacks of bilateral nasal obstruction, discharge, facial pain and headache, the condition was preceded with common cold. Anterior rhinoscopy showed yellowish discharge in right nasal cavity.

12. A 20 year old male patient complained of dull aching pain over the forehead for the last one year. The pain increased in the morning and then decreased gradually associated with intermittent nasal discharge. One week ago the pain became very severe with complete nasal obstruction, fever and deterioration of general condition; lastly he became drowsy with mental behavioral changes, vomiting and blurring of vision.

13. A 6 year old boy was seen by an ophthalmologist for headache of 2 months duration. Headache was present between the eyes. No ocular cause was detected and the child was referred to an otolaryngologist who noticed nasal tone of voice with bilateral nasal obstruction. The mother reported that her child opens his mouth and snores during sleep and also he complained of repeated attacks of chest infection.

14. A 44 year old female presented with bilateral nasal obstruction for the last 10 days. The condition was preceded with common cold, there was mild fever and headache. Examination showed tenderness at the root of the nose and between eyes.

15. A 30 year old man diagnosed to have deviated septum. He underwent operation, and postoperatively he noticed crusty nasal discharge with bleeding on removal of the crusts.

16. A 5 year old child presented with edema and redness of right eyelids that obstructing his eye, the condition was associated with fever (39), and right nasal discharge. The mother gave a history running nose and cough of her son for the last week.

17. A 40 year old woman complained of bilateral watery nasal discharge, alternating nasal obstruction. Examination showed mildly enlarged edematous turbinates.

18. A 32 year old male patient presented with bilateral nasal obstruction of 5 years duration. He gave a history of sneezing, lacrimation and bilateral watery nasal discharge that sometimes become yellowish green. Anterior rhinoscopy showed bilateral grape-like smooth glistening masses with clear nasal discharge.

19. A 30 year old man presented with right nasal obstruction and discharge. Examination revealed right nasal glistening mass. He gave no history of sneezing or bleeding.

20. An old male with right nasal obstruction developed epistaxis from the right side. Examination of the nose showed right nasal friable pink mass, which was not tender.

21. A 60 year old male had a severe attack of bilateral epistaxis. No history of local nasal diseases or trauma. Nasal examination showed no abnormality apart from both nasal cavities was filled with blood.

22. A 28 year old woman complained of long history of recurrent bilateral facial pain and nasal discharge. The doctor advised her to do endoscopic sinus surgery and after the operation the patient felt well but she complained of left watery nasal discharge.

Throat

1. A 5 year old boy presented with diminution of hearing. His mother gave history of recurrent bilateral earache, mouth breathing and snoring. Otoscopy showed retracted dull both tympanic membranes

2. A 4 year old child presented with dysphagia. He was on antibiotics for the last 10 days. Examination showed white coated tongue without suppuration, temperature was normal.

3. A 10 year old patient presented with fever (39), dysphagia, sore throat and abdominal pain. Examination showed pharyngitis with enlarged lymph nodes allover the body. CBC showed lymphocytosis with predominant monocytes (atypical lymphosytes).

4. A 30 year old female presented with dysphagia for 3 years, associated with dyspepsia and tongue ulcerations. Abdominal examination showed enlarged spleen, CBC showed microcytic hypochromic anaemia with normal levels of lymphocytes and platelets

5. A 20 year old female patient gives history of fever and difficulty of swallowing of 3 days duration. The condition progressed to throbbing pain and swelling in the left side of neck with severe dysphagia, dribbling of her saliva and inability to open the mouth. There was left earache.

6. A 35 year old man developed severe dysphagia, fever and tender submandibular swelling followed 3 days later by respiratory difficulty. Examination of his oral cavity showed dental caries, gingivitis with congested elevated floor of the mouth.

7. A 60 year old man presented with left sided neck swelling with regurgitation of undigested food on lying down. Examination showed cystic swelling on the left side of the neck which was not tender, indirect laryngoscopy showed froth in the left pyriform fossa.

8. A 16 year old boy presented with unilateral nasal obstruction and recurrent severe epistaxis, examination showed unilateral nasal mass, which is pink and bleeds on touch.

9. An old man with right ear deafness and tinnitus associated with right nasal obstruction and epistaxis. Examination of the right ear showed absent cone of light with bubbles behind intact retracted drum.

10. A 7 year old child developed bleeding per mouth 6 hours after tonsillectomy, the pulse was 110/min., blood pressure 90/60, and he vomited about 200cc of a dark fluid. 2 hours later he vomited another 150 cc of the same fluid, the pulse became 130/min. the blood pressure became 80/50.

11. A 3 year old girl presented with dysphagia, loss of weight, and choking during feeding for the last 4 months. The parents gave history of difficulty breathing and ulcerations of her mouth before starting the condition. The barium swallow showed a very long oesophageal stricture.

12. A 2 year old child developed common cold followed 2 days later by severe inspiratory stridor, hoarseness and dry cough.

13. A young boy developed sudden respiratory difficulty during eating. The condition improved spontaneously followed 2 days later by cough and dyspnea.

14. A 3 month old infant presented with repeated attacks of inspiratory stridor that increase with lying on the back and improve on lying prone. His crying showed no hoarseness. Flexible laryngoscopy showed folded epiglottis that prevents viewing of the vocal cords.

15. A 48 year old patient complained of difficulty of breathing of 3 months duration, he gave long history of cough and expectoration which is sometimes bloody. Indirect laryngoscopy showed pale granulations in the interarytenoid region.

16. A 30 year old man who was a victim to a car accident, he was admitted in coma in the ICU for 3 weeks while artificial ventilation was used. Now he is fully conscious but he is complaining of difficulty of breathing with noisy sound during the in and expiration.

17. A female teacher presented with hoarseness of voice for the last 2 months. She received medical treatment but it was not helpful.

18. A 9 year old boy developed changes of his voice that was followed by stridor. The stridor became severe that necessitate tracheostomy. Direct laryngoscopy showed multiple polypoid tissues that were removed. The condition recurred after one year and surgical intervention was performed again.

19. A woman developed hoarseness of voice after neck surgery (e.g. thyroidectomy).

20. A woman developed stridor after neck surgery.

21. A 62 year old man presented with progressive diminution of hearing in right ear. He had a swelling in the right upper neck. For the past month, he complained of blurred vision and facial pain. Otoscopy showed retracted mildly congested right drum. Weber

was lateralized to the right ear. There was limitation of right ocular mobility and right vocal cord. Neck examination showed enlarged hard right upper deep cervical nodes.

22. A 50 year old man presented with dysphagia for solids and progressive loss of weight for the last 3 months. 3 weeks ago, he developed neck swelling on the right side.

23. A 50 year old man who is chronic heavy smoker developed hoarseness, which was progressive for a month. Indirect laryngoscopy revealed vocal cord polypoid mass.

24. A 50 year old man who is chronic heavy smoker developed hoarseness of voice. He started to complain of cough and infrequent heamoptysis for the last 6 months. Indirect laryngoscopy revealed left vocal cord paralysis with no laryngeal masses.

25. A 60 year old male patient experienced left earache 3 months ago. One month later a swelling appeared on the left side of the neck that progressively increased in size. 2 weeks ago, he complained of dysphagia. He started to complain of hoarseness 4 days ago. Indirect laryngoscopy showed froth behind the left side of the larynx.

26. A 60 year old smoker man complained of change of voice for the last 4 months which was progressive. 2 weeks ago, he developed respiratory difficulty and dysphagia for solids. Neck examination showed enlarged right upper deep cervical lymph nodes.

27. A 5 year old child presented with painful tender midline neck swelling that moves up and down with swallowing and with protrusion of the tongue. Examination of the mouth and tongue revealed no abnormality.

Answers

Diagnosis should be reported depending on the data given in the quiz (i.e. write the reasons of diagnosis).

For example, case number 1 in the ear:
Diagnosis is Otitis externa (localized type, i.e. furuncle)
As the pain increases on mastication
The tragus is tender
There is a localized swelling in the external auditory canal.

N.B. In problem solving questions: *Management = investigations + treatment.*
N.B. In assay questions: Management = diagnosis (clinical picture and investigations) + treatment.
N.B. Differntial diagnosis means diseases similar to diagnosis and you should mention the difference (between the diagnosis and its similar)
N.B.In diseases of the ear and nose, you should mention the lesion is right, left, or bilateral.

Ear

1. Otitis externa (furuncle)
2. Otomycosis complicated with otitis externa.
3. Traumatic drum rupture with secondary infection (AOM)
4. Malignant otitis externa.
5. Herpes Zoster oticus on left side.
6. AOM on right side.
7. AOM with perforation.
8. Secretory otitis media.
9. Secretory otitis media secondary to adenoid.
10. Secretory otitis media secondary to unresolved AOM.
11. Bilateral secretory otitis media.
12. Right CSOM (safe type).
13. Brain abscess secondary to cholesteatoma.
14. Petrositis secondary to cholesteatoma.
15. Right facial paralysis secondary to AOM.
16. Meningitis secondary to cholesteatoma.
17. Mastoid abscess secondary to AOM.
18. Lateral sinus thrombophlebitis secondary to cholesteatoma.
19. Left facial paralysis secondary to cholesteatom (with exacerbation).
20. Bilateral safe CSOM with exacerbation.
21. Bilateral otosclerosis more on right.
22. Meniere's disease of right ear.
23. Longitudinal fracture base of the skull.
24. Glomus tumour on right side.
25. Acoustic neuroma on left side.
26. Malignant tumour of right ear.
27. Bell's palsy on left side.
28. Bilateral secretory otitis media secondary to cleft palate.

Nose

1. Bilateral choanal atresia.
2. Foreign body in left nasal side of the nose.
3. CSF rhinorrhoea.
4. Oro-antral fistula with left maxillary sinusitis.
5. Septal hematoma.
6. Right maxillary sinusitis of dental origin.
7. Furuncle of nasal vestibule.
8. Rhinolaryngoscleroma.
9. Atrophic rhinitis.
10. Mucormycosis.
11. Orbital complication of sinusitis with exacerbation.
12. Frontal lobe abscess secondary to sinusitis.
13. Adenoid causing sinusitis and descending infection.
14. Acute ethmoiditis.
15. Septal perforation.
16. Orbital complication of sinusitis.
17. Allergic rhinitis.
18. Bilateral allergic polypi.
19. Right antrochoanal polyp.

20. Malignant tumour on right nasal cavity.
21. Epistaxis most probably due to hypertension.
22. CSF rhinorhoea as a complication to ESS.

Throat

1. Adenoid causing bilateral secretory otitis media.
2. Moniliasis.
3. Infectious mononeucleosis.
4. Plummer-Vinson syndrome.
5. Quinsy (left).
6. Ludwig's angina.
7. Pharyngeal pouch.
8. Angiofibroma.
9. Right secretory otitis media may be due to nasopharyngeal carcinoma.
10. Reactionary haemorrhage.
11. Oesophageal stricture caused by corrosive.
12. Acute non-specific laryngitis, If there was dysphagia = epiglottitis, if there was productive cough = acute laryngotracheobronchitis.
13. Foreign body inhalation.
14. Laryngomalacia.
15. TB laryngitis.
16. Subglottic stenosis caused by prolonged intubation.
17. Singer's nodes.
18. Juvenile multiple papillimatosis.
19. Unilateral vocal cord paralysis.
20. Bilateral vocal cord paralysis.
21. Nasopharyngeal carcinoma.
22. Hypopharyngeal carcinoma.
23. Cancer larynx.
24. Bronchogenic carcinoma.
25. Hypopharyngeal carcinoma extended to larynx.
26. Cancer larynx extended to hypopharynx.
27. Infected thyroglossal cyst.

For more information about the author and the field of Otorhinolaryngology, please visit: www.ent-egypt.com

Pre-auricular sinus

It is a congenital disease.
Its site: infront of the root of the helix.
Characterized by repeated infections and discharge.
Treatment: excision

Cauliflower ear

It is a complication to perichondritis.
It affects the auricle causing deformity and outer third of external canal causing acquired stenosis.
Treatment: plastic surgery

Microtia,aural atresia and accessry auricle

It is caused by defect in the 1st branchial arch.
It causes CHL.
Treatment: meatoplasty before school age

Haemtoma of the auricle

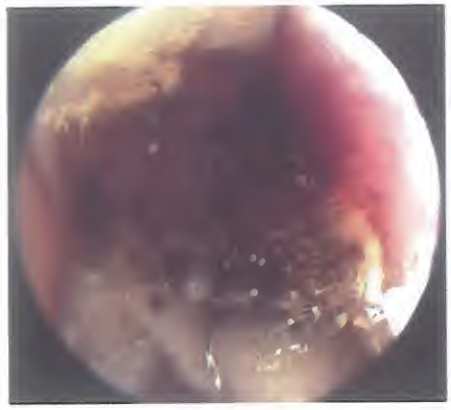
It is caused by blunt trauma.
It may be complicated with perichondritis.
Tretment: surgical evacuation.

Aural polyp

It is due to CSOM (more in unsafe).
Treatment: exploration with radical mastoidectomy if unsafe, simple polypectomy is contraindicated (may be attached to important structure).

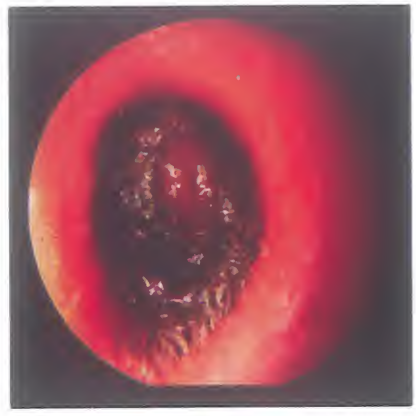
Mastoid abscess

It is a complication to otitis media (AOM or CSOM).
It is more common in children.
Investigation: CT.
Treatment: cortical mastoidectomy.



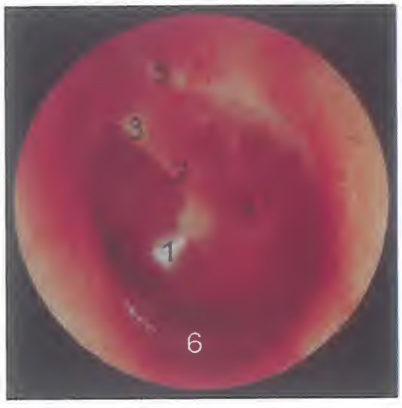
Otomycosis

Fungal hyphae is seen.
It is caused by aperigillus nigra and candida albicans.
It causes itching, and treated by antifungal ear drops



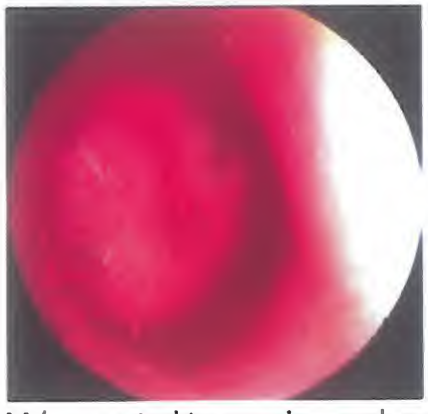
Wax

It is secreted from outer third of EAC.
It causes CHL.
Treatment: softening (glycerin bicarbonate) then wash



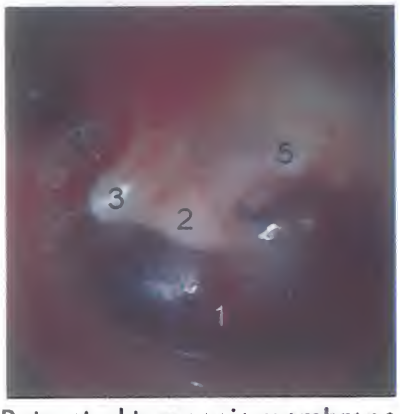
Normal tympanic membrane (left side)

It is left as cone of light and lat. process on left side.
1. Cone of light, 2. Handle of malleus, 3. Lat. process,
4. Pars tensa, 5. Pars flaccida, 6. Annulus.



AOM (congested tympanic membrane)

It is more common in children (?).
It causes CHL, tinnitus, and pain.
It may cause complications (more in children)



Retracted tympanic membrane

It is caused by Eustachian tube obstruction.
1. absent cone of light, 2. shortened handle of malleus.
3. promenent lat. process. 4,5. exaggerated folds

Adhesive otitis media

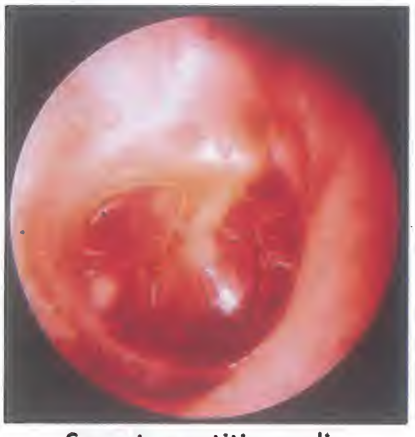
The promontory (P) is seen through the thinned drum
It is caused by longstanding ET obstruction, secretory otitis media, or healed CSOM.

Bollous myringitis

It is usually preceded by upper respiratory infection.
It causes CHL
Treatment: antibiotics (local and systemic)

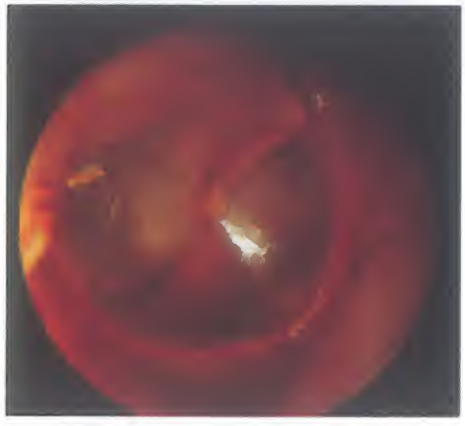
Exostosis

It may be single or multiple, unilateral or bilateral.
It may be due to cold water exposure (among water sport fans)



Secretory otitis media

The bubbles are seen.
It causes CHL.
It is caused by Eustachian tube obstruction.



Secretory otitis media

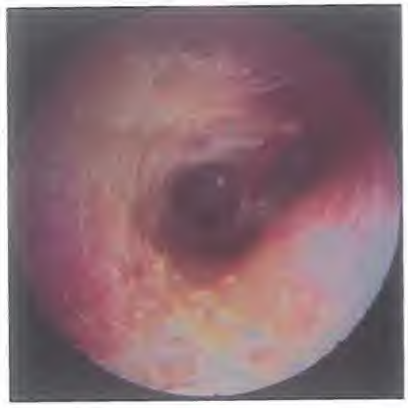
Hair line (fluid level) is seen.
It is the commonest cause of hearing loss in children.
Unilateral in old is alarm to nasopharyngeal tumour

Grommet's tube in the tympanic membrane

The primary disease is secretory otitis media.
It is performed after failure of medical treatment.

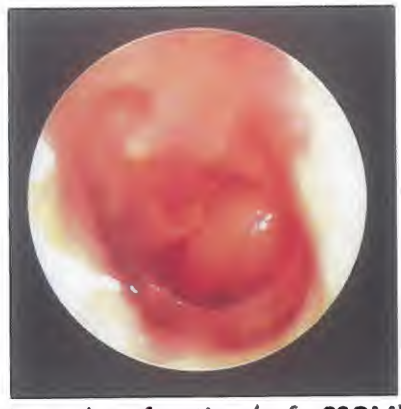
Tympanosclerosis

It may be due to old healed perforation (traumatic or pathological), secretory otitis media, or idiopathic.



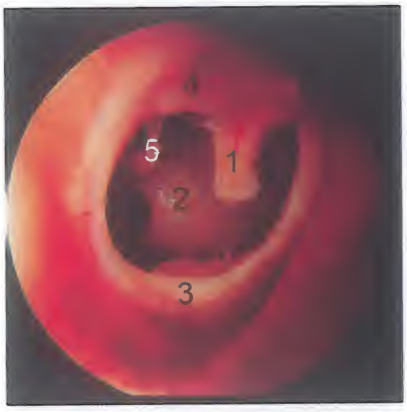
Central perforation (safe CSOM)

PTA shows CHL.
Treatment: tympanoplasty without cortical mastoidectomy (the ear is dry)



Central perforation (safe CSOM)

Discharge is intermittent, profuse, mucopurulent, and ouderless (the middle ear mucosa is congested).
Treatment: tympanoplasty with cortical mastoidectomy



Subtotal perforation (safe CSOM)

1. handle of malleus, 2. promontory, 3. annulus,
4. pars flaccida, 5. incudo-stapedial joint.
N.B. total perforation as subtotal but without handle.

Attic cholesteatoma (unsafe CSOM)

Cholesteatoma (whitish keratinous mass) is seen passing from the pars flaccida.
Treatment: atticotomy or attico-antrostomy.

Marginal perforation (unsafe CSOM)

Whitish keratinous material is seen.
The discharge is persistent, scanty, purulent, offensive, and may contain epithelial debris.

Cholesteatoma

Whitish keratinous material and reddish granulations are seen.
Treatment: radical mastoidectomy (if extensive).

Traumatic rupture of tympanic membrane

It is a central type in pars tensa with blood around it.
If no healing spontaneously within 6 months: myringoplasty is indicated.

Glomus tumour

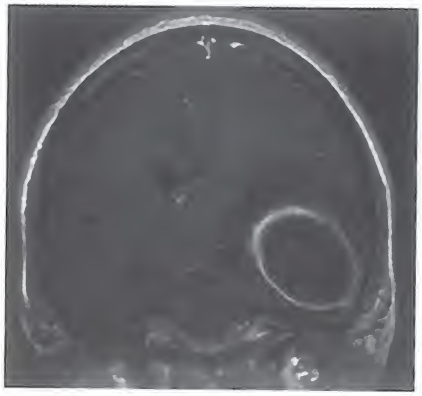
A reddish sweling is seen through the lower part of TM.
The patient has CHL and pulsatile tinnitus.
The most important investigation is angiography.

Foreign body (insect) in the EAC

It causes irritation and noise in the ear.
It should be killed by oil drops before ear wash.

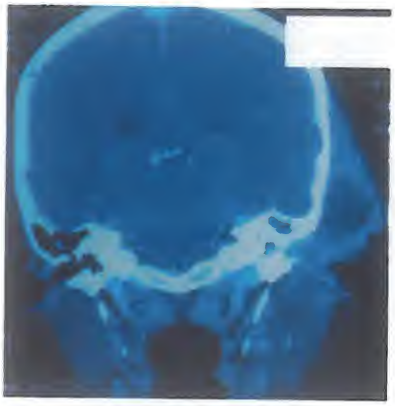
Facial paralysis

Inability to close the eye on the paralysed side.
Deviation of the mouth to the normal side on smiling.
Bell's palsy is diagnosed if no detectable cause.



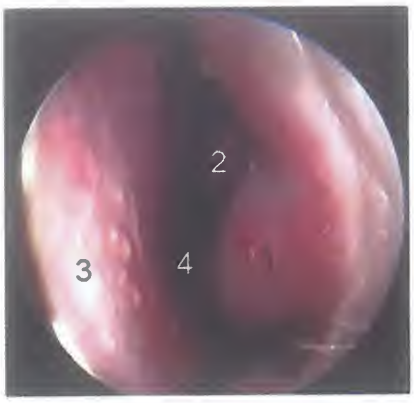
Brain abscess (temporal lobe)

MRI shows the characteristic ring sign.
Headache is an alarming symptom.
Drainage of abscess should precede mastoidectomy.



Mastoid abscess

CT shows subperiosteal collection.
Treatment: cortical mastoidectomy, some prefer to do radical mastoidectomy if the cause was cholesteatoma

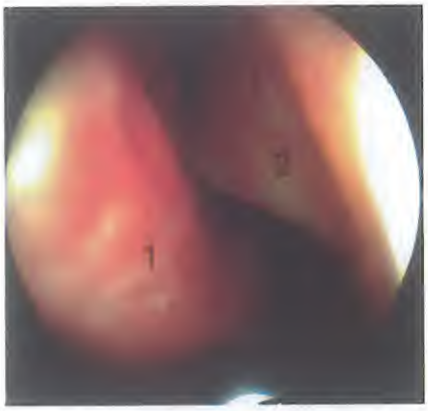


Normal nasal cavity

Endoscopic view for left nasal side showing:
1. Inferior turbinate.
2. Middle turbinate.
3. Nasal septum.
4. nasal cavity.

Enlarged inferior turbinate

Endoscopic view for left nasal side showing:
1. Inferior turbinate which is enlarged.
2. nasal septum which is mildly deviated.



Deviated septum with spur

Endoscopic view for right nasal side showing:
1. Inferior turbinate.
2. Deviated septum with spur (sharp angulation)

Septal dislocation

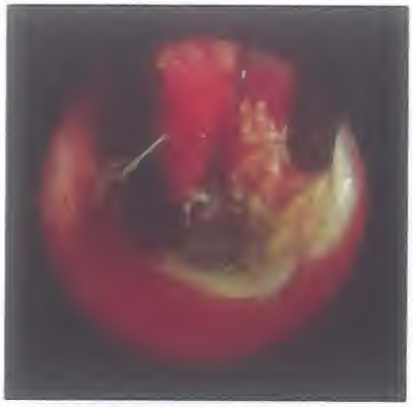
The nasal septum (1) is dislocated away from the collumela (2).
Treatment: septoplasty

Septal perforation

It may be due to: previous septal surgery, septal abscess, lupus, leprosy, or cocaine addiction.
It causes crustations and epistaxis.

Septal haematoma

It may be due to: septal surgery, or facial trauma (may be associated with fracture nose).
It may be complicated with septal abscess.



Atrophic rhinitis

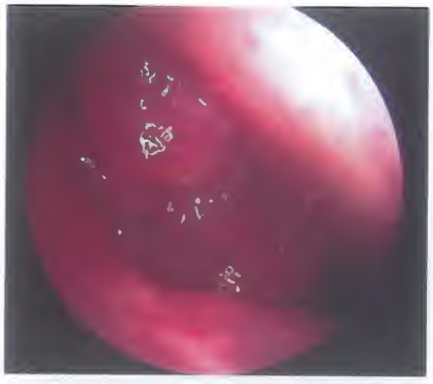
It causes offensive crustations, epistaxis, obstruction, and anosmia.
Treatment: alkaline nasal douche + mentol paraffin.

Oro-antral fistula

It is related to the 2nd premolar and 1st molar teeth.
It cause unilateral regurgitation of food and fluids with offensive nasal discharge (maxillary sinusitis).

Antro-choanal polyp

It arises from maxillary antrum to the choana.
It is unilateral, single, glistening, soft, and mobile.
Investigation: CT is diagnostic



Allergic nasal (ethmoidal) polyps

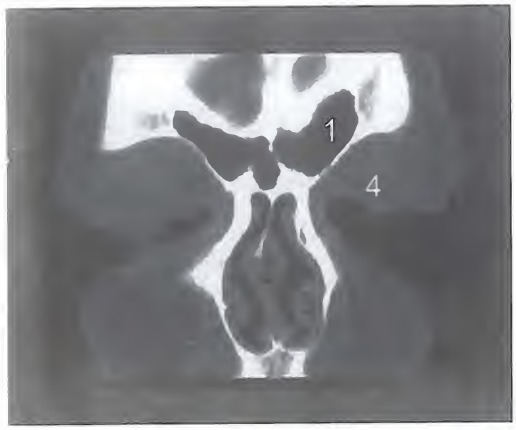
They arise from ethmoid sinus to nasal cavity.
They are bilateral, multiple, glistening, soft, mobile.
Investigation: CT is important preoperatively.

Nasal polyps

The polyps appear glistening, pale bluish, smooth.
It may be due to allergic rhinitis (bilateral), or allergic fungal sinusitis (unilateral or bilateral).

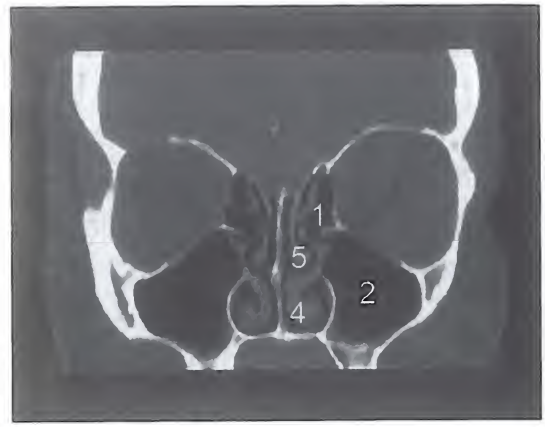
Nasal tumour

It is more common in old male.
It causes unilateral obstruction ± epistaxis.
Investigations: CT and biopsy (to detect the nature)



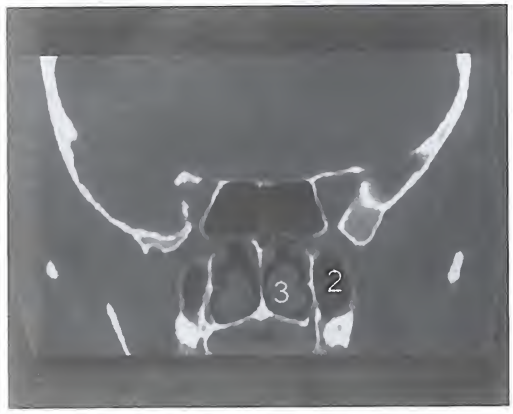
CT paranasal sinuses: coronal view, ant. cut

1. Frontal sinus. 2. Nasal septum.
3. Inferior turbinate. 4. Orbit.



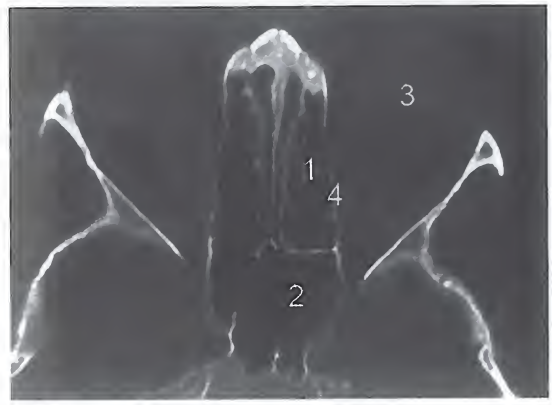
CT paranasal sinuses: coronal view, mid. cut

1. Ethmoid sinus. 2. Maxillary sinus.
3. Orbit. 4. Inf. turbinate. 5. Mid. turbinate.



CT paranasal sinuses: coronal view, post. cut

1. Sphenoid sinus. 2. Maxillary sinus.
3. Posterior end of inf. turbinate inside the choana.

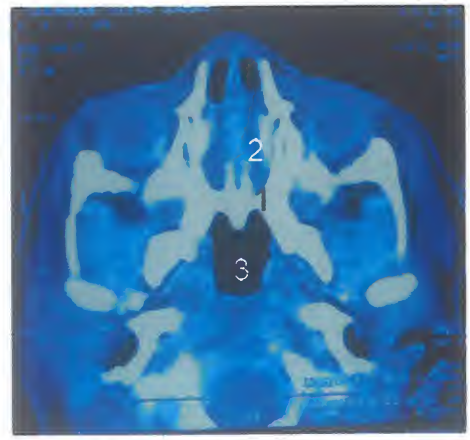


CT paranasal sinuses: axial view

1. Ethnoid sinus. 2. Sphenoid sinus.
3. Orbit. 4. Lamina papyracea.

Deviated septum

The main symptom is nasal obstruction.
Treatment: SMR or septoplasty



Bilateral choanal atresia

It is an emegency situation.
1. Atretic plate. 2. Nasal cavity. 3. Nasopharynx.

Bilateral enlarged inferior turbinates

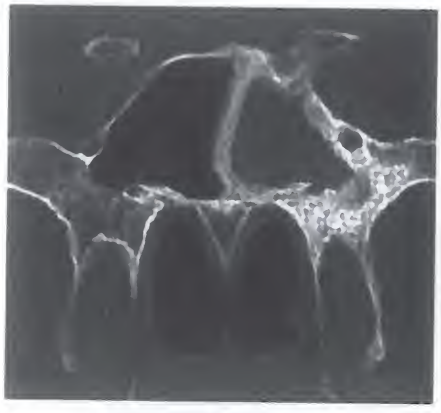
It causes bilateral obstruction, snoring and apnea.
Treatment: partial turbinectomy (surgical or laser), submucous diathermy may be used

Maxillary sinusitis

Dental problem may be a cause.
It causes cheek pain and the discharge may be foetid.
Treatment: FESS (functional endoscopic sinus surgery)

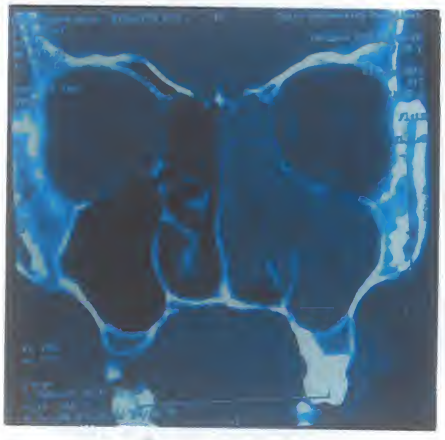
Ethmoidal sinusitis

It is the commonest type of sinusitis.
It causes pain at the root of nose, medial to the eye.
Treatment: FESS



Sphenoidal sinusitis

It causes occipital headache.
This sinus is related to the internal carotid artery, optic nerve, and pituitary gland.



Antro-choanal polyp

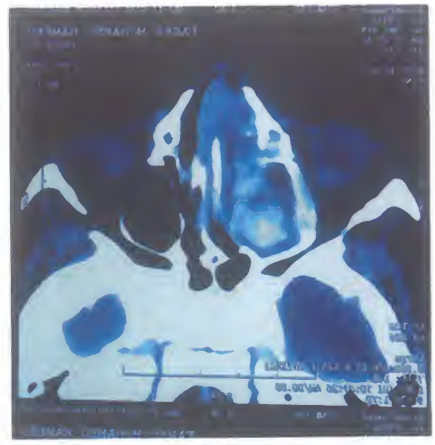
1. Inside the maxillary antrum. 2. Passing through the meatus. 3. Inside the nasal cavity.

Antro-choanal polyp

1. Maxillary antrum. 2. Middle meatus.
3. Nasal cavity. 4. Choana to nasopharynx.

Allergic fungal sinusitis

Heterogeneous opacity (calcification) is seen filling the maxillary and ethmoid sinuses, and nasal cavity.

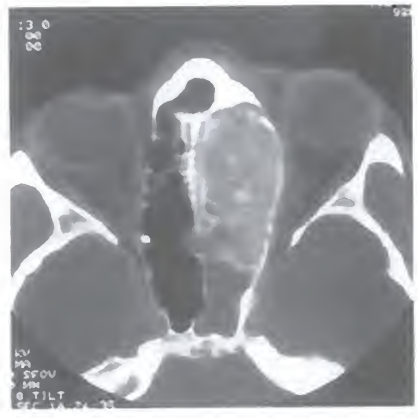


Allergic fungal sinusitis

Also bone expansion is seen in both views.
Treatment: endoscopic sinus surgery and steroids.

Nasal tumour

1. Tumour in the nasal cavity.
2. Maxillary sinusitis due to obstruction of the meatus.
The tumour is more dense than the fluid of sinusitis.



Fibrous dysplasia

The lesion in the ethmoid and nasal cavity.
Ground glass appearance is seen in the lesion.
Treatment: excision after the age of sexual maturity.

Mucocele of ethmoid sinus

Regular low dense sac with bone expansion.
Treatment: endoscopic sinus surgery.

Osteoma of frontal sinus

Regular high dense lesion.
Treatment: excision (external incision is needed)

Oral cavity and Oropharynx

1. Tonsil.
2. Anterior pillar.
3. Uvula.
4. Palate.

Acute follicular tonsillitis

The commonest organism: B-hemolytic streptococci.
It causes fever and dysphagia.

Acute follicular tonsillitis

It causes referred earache through Jackbson's nerve.
It may affect the heart (rheumatic fever).
Treatment: Medical (antibiotics + antipyretics)

Kissing tonsils (markedly enlarged)

It causes snoring and sleep apnea, dysphagia, and hot potato voice.
Treatment: tonsillectomy

Quinsy

It is a complication to acute tonsillitis.
It causes dysphagia, odynophagia, trismus, torticollis.
Treatment: surgical drainage+antibiotics+antipyretics.

Enlarged (long) uvula

It causes snoring and sleep apnea.
It is the commonest cause of snoring in adults (obese).
Treatment: uveopalatopharyngoplasty (UPPP).

Ludwig's angina

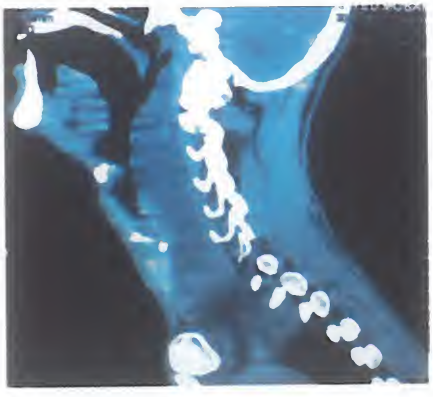
It may be caused by dental infection.
Airway obstruction by the tongue may cause death.
Treatment: antibiotics + antipyretics + drainage

Moniliasis

The causative organism is candida albicans (fungi).
Prolonged antibiotics or diabetes may be the cause.
It causes dysphagia without fever.

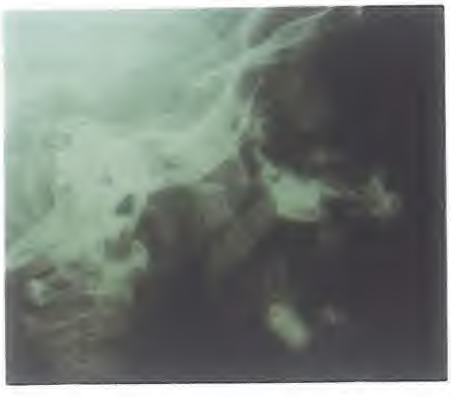
Parapharyngeal abscess

It is a complication to acute tonsillitis, quinsy, or tonsillectomy.
It causes dysphagia, odynophagia, trismus, torticollis.



Acute retropharyngeal abscess

It is a disease of children, due to suppuration in the lymph gland of Henle.
It may cause stridor by compression on the larynx.

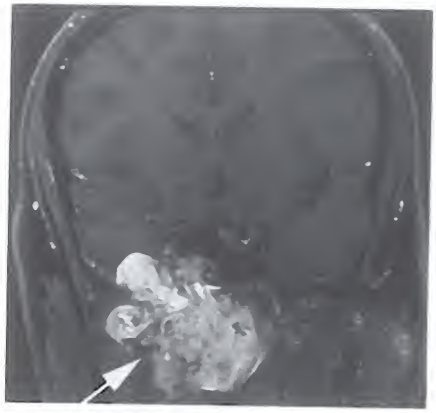


Adenoid

It causes snoring and sleep apnea.
It may cause conductive hearing loss (ET obstruction).
Treatment: adenoidectomy.

Coin in hypopharynx

The child complains of dysphagia.
Site of impaction: at cricopharyngeus (hypopharynx).
Hypopharyngoscopy is used in diagnosis and removal.



Angiofibroma (MRI, coronal)

It is a disease of boys (never girls).
The commonest symptom is epistaxis.
The most important investigation is angiography.

Angiofibroma (MRI, axial)

Benign vascular tumour arises from sphenopalatine f.
Biopsy is contraindicated due to bleeding.
Treatment: surgical excision after embolization.

Enlarged cervical lymph node

It may be 1ry (lymphoma), or 2ry from silent areas of head and neck.
Open biopsy is not preferred before detection of 1ry.

Cleft palate

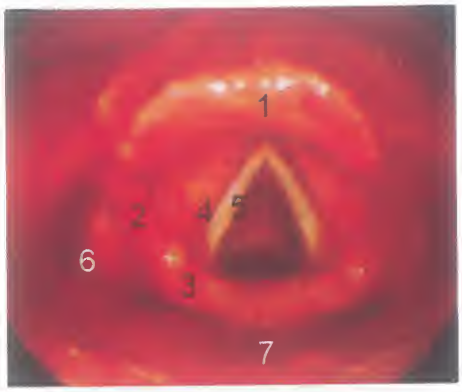
It cause rgurgitation of food and fluids, and rhinolalia aperta (hypernasality), CHL (ET obstruction).
Treatment: repair at the age of 10 months.

Thyroglossal cyst

It is the commonest midline neck swelling.
It moves up and down with deglutition and protrusion of tongue, and treated by Sistrunk's operation.

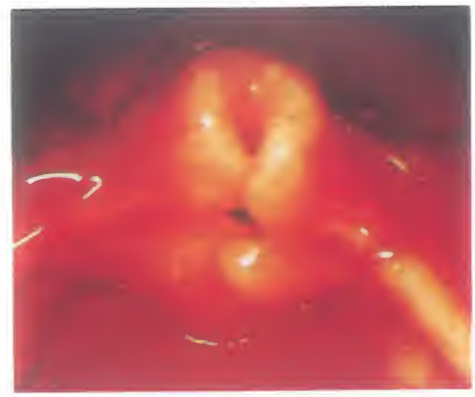
Enlarged parotid gland

It elevates the lobule of the ear.
The facial nerve passes through it.
The commonest tumour is pleomorphic adenoma.



Normal larynx and hypopharynx

Direct laryngoscopy shows: 1. Epiglottis
2. Aryepiglottic fold. 3. Arytenoid. 4. False cord.
5. true vocal cord. 6. pyriform fossa. 7. postcricoid



Laryngomalacia

Direct laryngoscopy shows: collapse of the larynx during inspiration with omega-shaped epiglottis.
It causes stridor without hoarseness.

Laryngeal web (glottic)

Direct laryngoscopy shows:
1. The web. 2. True vocal cord. 3. Endotracheal tube.
It causes stridor and hoarseness.

Vocal cord cyst

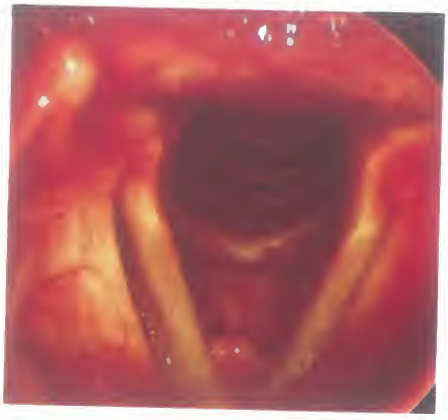
Direct laryngoscopy shows left vocal cord cyst.
It causes hoarseness of voice.
Treatment: microlaryngosurgery

Reinke's oedema

Flexible laryngoscopy shows oedema of both cords.
It causes hoarseness (no stridor).
Treatment: microlaryngosurgery (stripping)

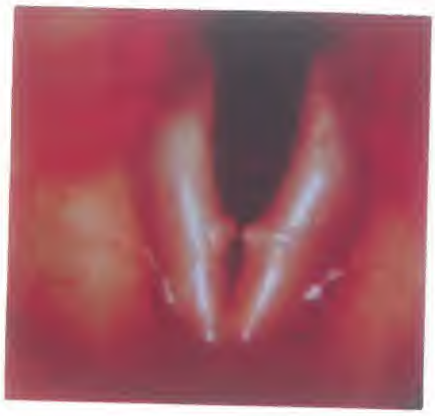
Intubation granuloma

Flexible laryngoscopy shows mass on right arytenoid.
It is caused by rough endotracheal intubation.
Treatment: microlaryngosurgery (high recurrence rate).



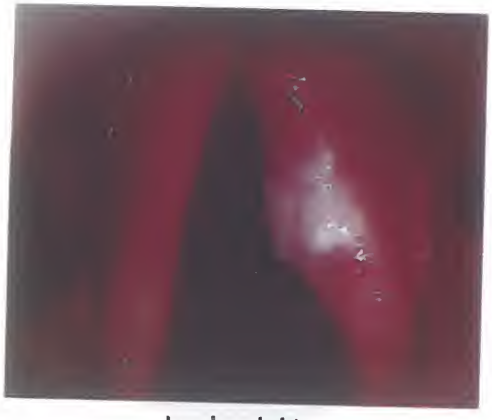
Laryngeal polyp

Flexible laryngoscopy shows right vocal cord polyp.
It causes hoarseness (no stridor).
Treatment: microlaryngosurgery.



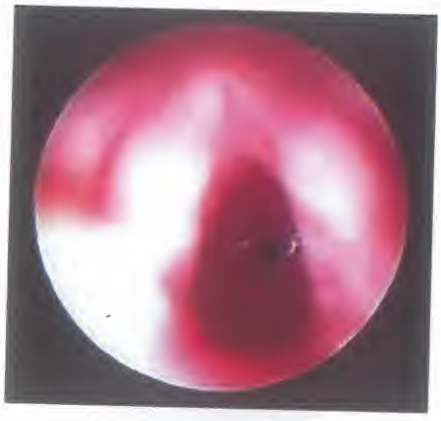
Laryngeal nodules

Flexible laryngoscopy shows singer's nodes (bilateral)
It causes hoarseness (no stridor).
Treatment: microlaryngosurgery.



Leukoplakia

Direct laryngoscopy shows white patch on right cord.
It is caused by chronic irritation (smoking).
Precancerous and removed by microlaryngosurgery.



Subglottic stenosis (web)

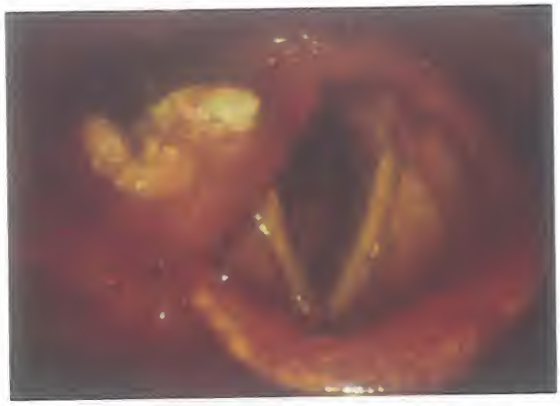
It causes stridor (hoarseness is not marked).
Causes: prolonged intubation or laryngoscleroma.
Treatment: microlaryngosurgery (laser excision).

Laryngeal papilloma (single)

Direct laryngoscopy shows papilloma on left cord.
It may turn malignant.
Treatment : microlaryngosurgery.

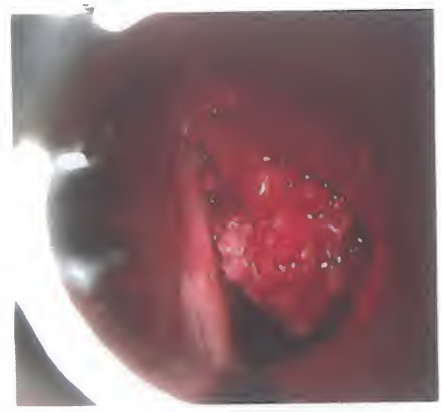
Multiple papillomatosis

Direct laryngoscopy shows multiple papillomata.
It never turn malignant.
Treatment: repeated microlaryngosurgery (recurrent).



Pyriform fossa carcinoma

Flexible laryngoscopy shows mass in right pyriform.
It is one of the silent areas.
It causes referred otalgia through Arnold's of vagus.



Cancer larynx (glottic)

Direct laryngoscopy shows mass on right vocal cord.
This large mass can cause hoarseness and stridor.
Investigation: biopsy by direct laryngoscopy.

Cancer larynx (glottic)

Direct laryngoscopy shows mass on right vocal cord extended to the anterior commissure.

Cancer larynx (glottic)

Direct laryngoscopy shows mass on right vocal cord limited to middle part.

Normal neck

1. Hyoid bone.
2. Thyroid cartilage.
3. Cricoid cartilage.
4. Trachea.

Goiter

Swelling in the lower part of the front of the neck.
It moves up and down with deglutition.